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Electric Furnaces and Heat Treatment

A Survey of Their Commercial Application to Steel and Other Industries —Over 80 in the United States

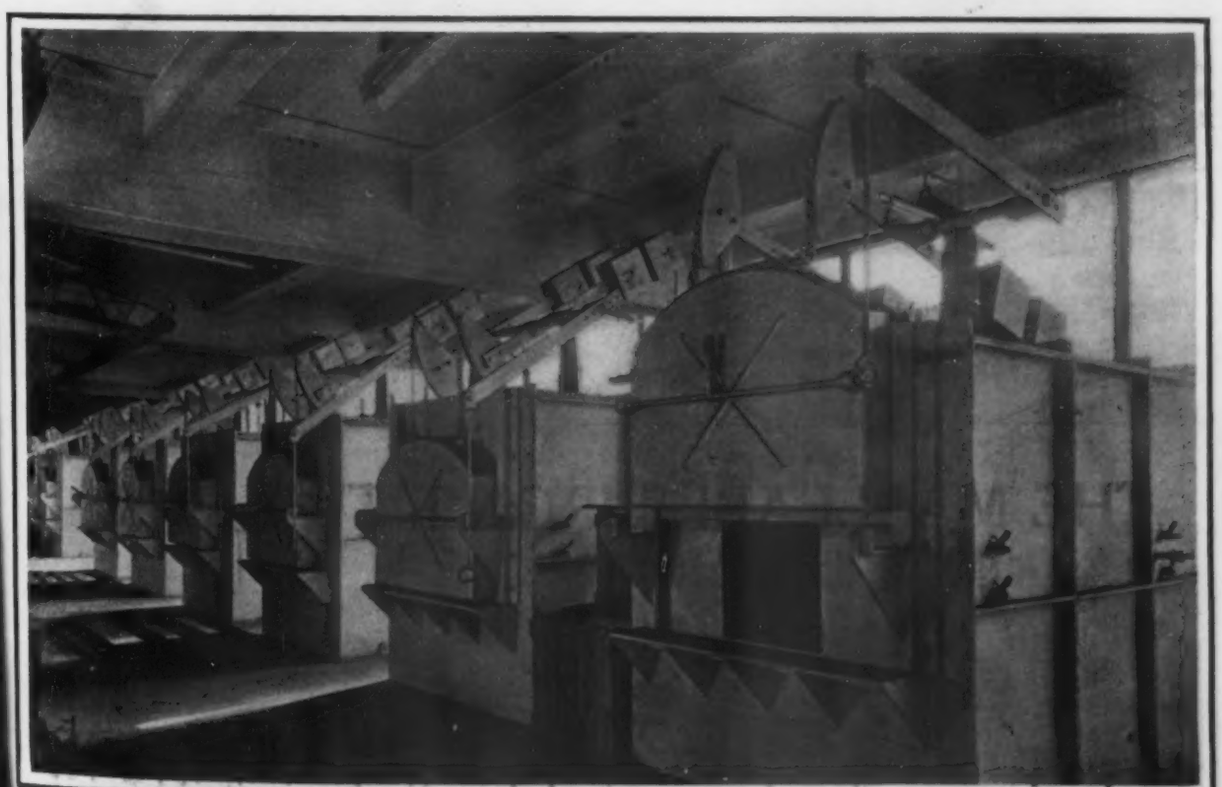
BY EDWIN F. CONE

THE electrical heat treatment of steel of all kinds has expanded extensively in the last few years. This has been particularly marked recently. Beginnings were made just before the war in treating steel with electricity as the source of heat, but it was the war which really furnished the stimulus which has made this phase of heat treatment one of importance.

An attempt is made in the following article to present a general, but not necessarily complete, review of the extent to which electrical apparatus or furnaces are used commercially in the United States as a means of heat treating steel. It is not claimed that in the summary every type of furnace has been included, but the facts as presented cover the main features of this remarkable development.

Several companies have developed furnaces of types especially adapted to the product to be treated. Not only are castings and forgings now being treated in such furnaces, but sheets, steel chain, automobile parts, axles, bolts and nuts and small parts for airplanes, as well as non-ferrous and other products. In order to reveal the extent to which this method of heat treatment is being applied industrially, steel, non-ferrous and other installations are included, but no attempt is made to mention laboratory or research appliances.

IT is pretty generally recognized that one of the pioneers, if not the pioneer, in applying electricity to heat-treating problems was T. F. Baily, of the Electric Furnace Co., Alliance, Ohio. One of the earliest Baily installations was made in 1914 at the plant of the William A. Rogers, Ltd., Niagara Falls, N. Y.,



Battery of Eight Electric Heat-Treating Furnaces Installed by Holcroft & Co., Detroit, at the Plant of the Packard Motor Co., Detroit. The first six furnaces operate at 1650 deg. Fahr. and the last two at 1100 deg. Fahr. They are used for hardening and drawing crankshafts

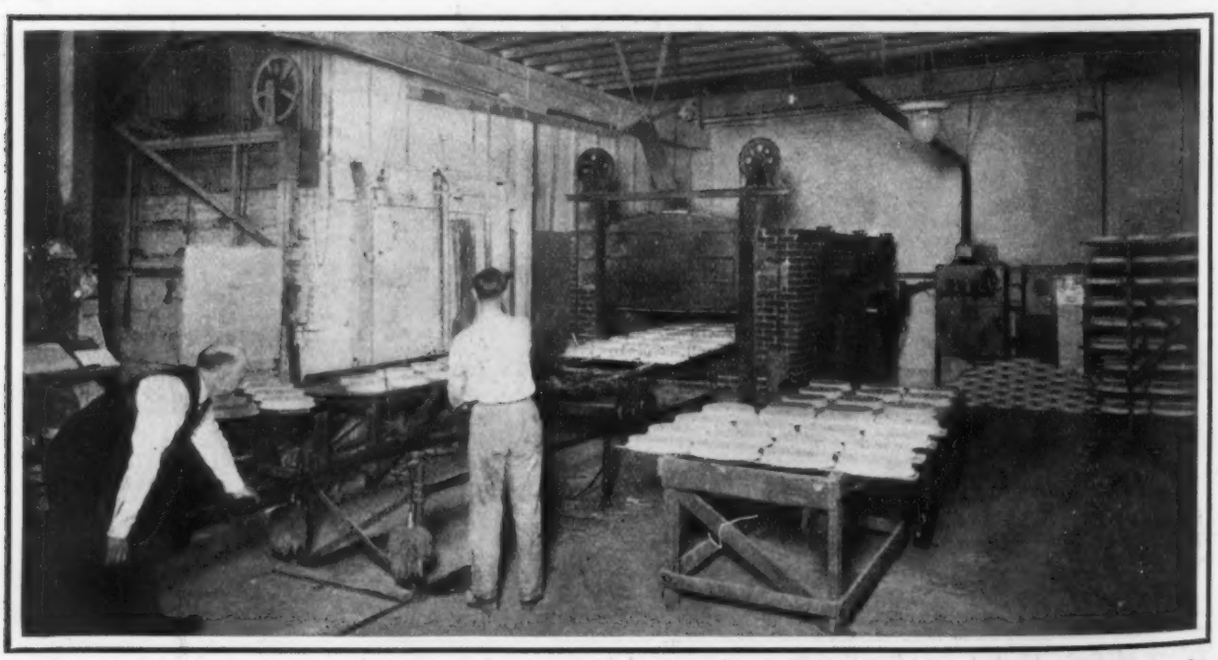
Table of Principal Electric Furnaces Installed or Contracted for as of Sept. 1, 1921, Using General Electric Equipment for Heat Treating Steel, Etc.

Company and Location	Size of Furnace and Product Treated	Kw. of Each
Adel Clay Products Co., Adel, Iowa	1 Furnace 2 ft. wide, 2 ft. high, 2 ft. long; 50 lb. per hr. Firing clay for phonograph needles	15
Connecticut Elec. Steel Co., Hartford, Conn.	1 Furnace 3 ft. wide, 2 ft. 8½ in. high, 4 ft. 4 in. long; 3000 lb. 12 hr., including 1 hr. soaking period. Annealing steel castings	45
St. Louis Brass Co., St. Louis	1 Furnace 4 ft. wide, 2 ft. high, 10 ft. long; 1300 lb. per hr. Firing vitreous enamel on cooking utensils and lamp reflectors	150
Standard Equipment Co., Cleveland	2 Furnaces 3 ft. wide, 2 ft. high, 6 ft. 4 in. long; 160 lb. per hr.	60
	2 Furnaces 4 ft. 9 in. diam., 2 ft. high; 500 lb. per hr. Carbonizing gears and roller bearings and heat treating ring gears	60
Eastman Kodak Co., Rochester, N. Y.	1 Furnace 1 ft. 6 in. wide, 2 ft. high, 5 ft. 6 in. long; 185 lb. per hr. Annealing glass lens blanks	47
Spencer Lens Co., Hamburg, N. Y.	1 Furnace 4 ft. 6 in. diam., 4 ft. deep. Annealing large glass lenses for telescopes	24
General Motors Corp. (Central Gear), Detroit, Mich.	1 Furnace 4 ft. 9 in. diam., 2 ft. high; 500 lb. per hr. Heat treating gears	60
Chase Metal Works, Waterbury, Conn.	1 Furnace 6 ft. 6 in. wide, 2 ft. 6 in. high, 24 ft. long; 8300 lb. per hr. Annealing brass stock, rods, plate, etc.	425
Aluminum Co. of America, Cleveland	1 Furnace 4 ft. wide, 2 ft. 6 in. high, 10 ft. long. Annealing aluminum	60
Galusha Stove Co., Buffalo, N. Y.	1 Furnace 3 ft. 6 in. wide, 2 ft. high, 5 ft. long; 750 lb. per hr. Firing vitreous enamel on stove parts	95
Acheson Graphite Co., Niagara Falls, N. Y.	1 Furnace, 2 ft. 10 in. wide, 6 ft. high, 9 ft. 7 ft. long; 113 lb. per hr. net. Baking graphite electrodes	75
Crosby Co., Buffalo, N. Y.	1 Furnace 2 ft. wide, 2 ft. high, 3 ft. long; 150 lb. per hr. Hardening dies	20
Standard Pencil Co., St. Louis	1 Furnace 3 ft. 9 in. wide, 2 ft. high, 12 ft. long; 500 lb. per hr. (process). Baking graphite for lead pencils	114
Gleason Works, Rochester, N. Y.	1 Furnace 17 in. wide, 2 ft. high, 10 ft. long; 550 lb. per hr. Hardening gears	72
Amoskeag Mfg. Co., Manchester, N. H.	1 Furnace 3 ft. wide, 3 ft. high, 6 ft. long; 350 lb. per hr. Heat treating steel rolls	48
Waterbury Mfg. Co., Waterbury, Conn.	1 Furnace 4 ft. 6 in. wide, 2 ft. 2 in. high, 16 ft. 9 in. long; 1000 lb. per hr. Annealing brass punchings, etc.	80
Muncie Cap & Set Screw Co., Muncie, Ind.	1 Furnace 2 ft. 9 in. wide, 2 ft. 5 in. high, 7 ft. long; 600 lb. per hr. Hardening cap and set screws	80
Saco Lowell Shops, Biddeport, Me.	1 Furnace 3 ft. diameter, 2 ft. 8 in. high; 300 lb. per hr. Heat treating knitting machine spindles	45
Bishop & Babcock Co., Cleveland	1 Furnace 2 ft. wide, 2 ft. high, 4 ft. 6 in. long; 400 lb. per hr. Annealing brass tubing	50
General Electric Co., Schenectady, N. Y.	1 Furnace 15 ft. 10 in. wide, 8 ft. 7 in. high, 27 ft. 7 in. long; 4000 lb. per hr. Annealing housing castings	690
General Electric Co., Schenectady, N. Y.	1 Furnace 30 in. wide, 24 in. high, 40 in. long; 175 lb. per hr. Pack hardening lathe centers, thrush bearings, boring bars and bushings	20
General Electric Co., Schenectady, N. Y.	1 Furnace 30 in. wide, 24 in. high, 40 in. long; 250 lb. per hr. Drawing temper on high-speed cutting tools	20
General Electric Co. (Baltimore Works), Baltimore, Md.	1 Furnace 3 ft. wide, 2 ft. 8 in. high, 6 ft. 6 in. long; 1300 lb. per hr. Annealing punchings. Each compt.	90
General Electric Co., Schenectady, N. Y.	2 Furnaces 1 ft. 6 in. wide, 2 ft. high, 4 ft. long; 330 lb. per hr. Firing vitreous enamel on resistance tubes	24
General Electric Co., Schenectady, N. Y.	2 Furnaces each 2 ft. 6 in. wide, 2 ft. high, 3 ft. long; 125 lb. per hr. Hardening stamping dies	20
	1 Furnace 1 ft. 6 in. wide, 2 ft. high, 2 ft. long; 160 lb. per hr. Drawing temper on stamping dies	20
	1 Furnace 5 ft. wide, 15 ft. high, 8 ft. long; 50 lb. per hr. (Heating chamber 1 ft. 2 in. wide, 4 ft. high, 3 ft. 4 in. long.) Annealing X-ray tubes	30
General Electric Co. (Bridgeport Works), Bridgeport, Conn.	1 Furnace 15 in. wide, 2 ft. 3 in. high, 2 ft. long; 160 lb. per hr. Hardening dies, tools, etc.	35
General Electric Co. (National Lamp Works)	1 Furnace 3 ft. wide, 2 ft. high, 14 ft. long; 10 cu. ft. bulbs per hr. Annealing miniature lamp bulbs	60

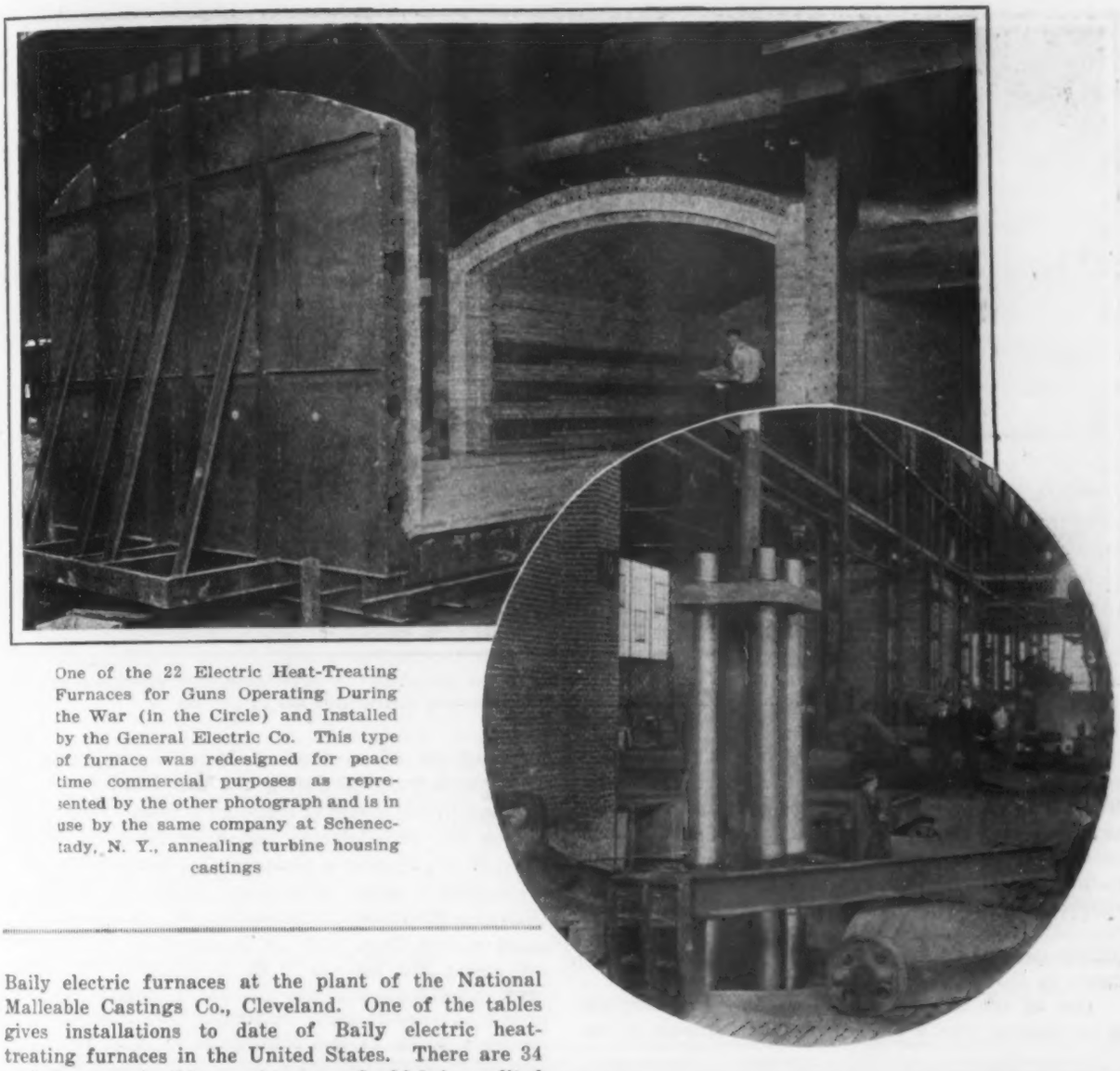
Girod Electric Steel Co., France, has one 265-kw. furnace, 9 ft. wide and 15 ft. long, for annealing 1400 lb. of tool steel stock per hr.

for annealing flat ware. A little later, or in 1915, the Otis Elevator Co., Niagara Falls, installed two Baily furnaces for annealing elevator steel castings.

It is claimed that one of the factors which made cast steel anchor chain a commercial success during the war was the proper heat treatment made possible by



An Electric Furnace in the Enameling Industry, Firing Vitreous Enamel on Cooking Utensils and Lamp Reflectors at the Plant of the St. Louis Brass Co., St. Louis. The operating temperature is 1700 deg. Fahr.



One of the 22 Electric Heat-Treating Furnaces for Guns Operating During the War (in the Circle) and Installed by the General Electric Co. This type of furnace was redesigned for peace time commercial purposes as represented by the other photograph and is in use by the same company at Schenectady, N. Y., annealing turbine housing castings

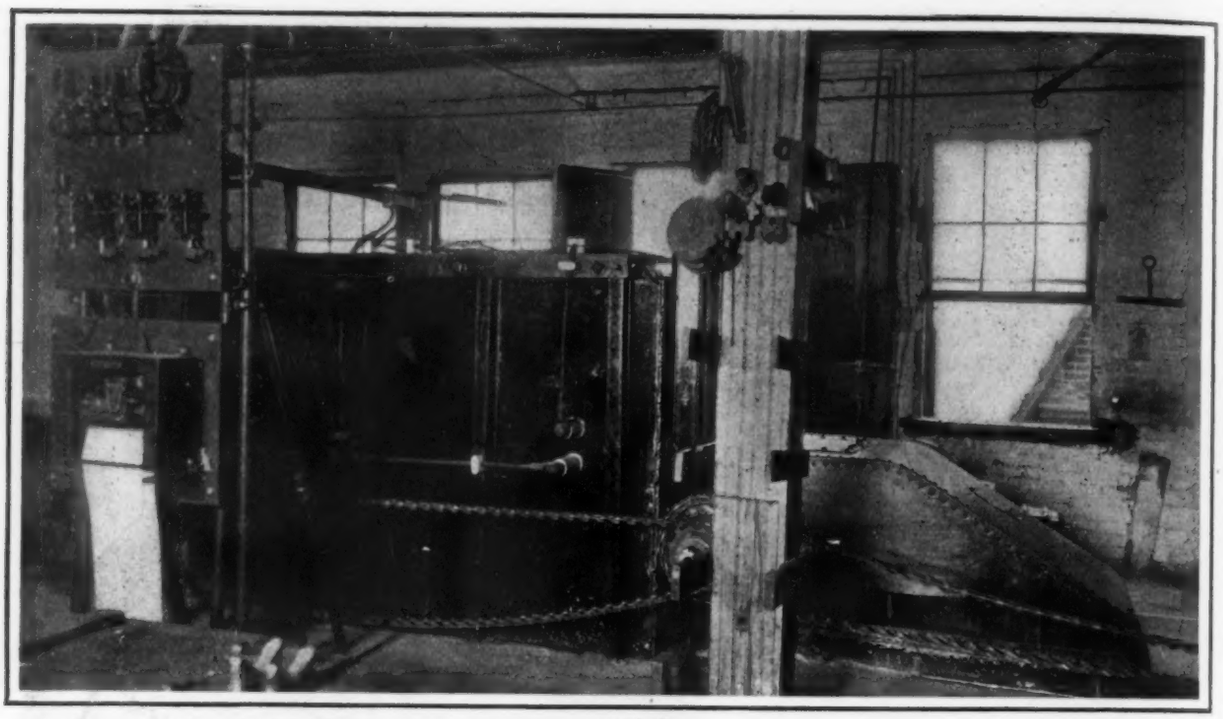
Baily electric furnaces at the plant of the National Malleable Castings Co., Cleveland. One of the tables gives installations to date of Baily electric heat-treating furnaces in the United States. There are 34 such furnaces in this country, one of which is credited to the non-ferrous industry. Of this total 10 were contracted for since Jan. 1, 1920.

Another pioneer in this field is the General Electric Co., which has to its credit the development of large commercial electric heat-treating furnaces of the metallic resistor type. This company states that it

Table of Baily Electric Furnaces Installed or Contracted for on Sept. 1, 1921, for Heat Treating

Company and Location	Product Treated	No. of Units	Kw. of Each	Total Kw.	Daily Tonnage
Wm. A. Rogers, Ltd., Niagara Falls, N. Y.	Annealing flat ware	2	200	400	24
Wm. A. Rogers, Ltd., Niagara Falls, N. Y.	Annealing flat ware	1	200	200	12
Otis Elevator Co., Niagara Falls, N. Y.	Annealing elevator castings	2	150		
			300	450	36
National Malleable Castings Co., Sharon, Pa.	Annealing draw bars knuckles	4	900		
			900	3,600	144
United States Aluminum Co., Massena, N. Y.	Aluminum castings	1	50	50	6
Erie Specialty Co., Erie, Pa.	Small steel parts for airplanes and tractors	2	150		
			150	300	24
Pierce Arrow Motor Car Co., Buffalo, N. Y.	Transmission gears	1	40	40	4
Laclede Steel Co., St. Louis	Railroad axles	1	150	150	12
National Malleable Castings Co., Cleveland	Anchor chain*	6	900	5,400	150
Ingalls-Shepard Forging Co., Harvey, Ill.	Crank shafts	2	900	1,800	144
Braeburn Steel Co., Braeburn, Pa.	Annealing steel	1	600	600	75
Standard Steel & Bearing Co., Philadelphia	Roller bearings and ball races	1	150	150	12
Lamson & Sessions, Cleveland	Heat treating bolts	1	40	40	4
Timken Roller Bearing Co., Canton, Ohio	Roll hardening	1	75	75	5
Mullins Body Corporation, Salem, Ohio	Sheet heating	1	100	100	9
Ohio Steel Foundry, Springfield, Ohio	Annealing castings	1	200	200	18
C. Harold Wills, Detroit, Mich.	Automobile parts**	2	600	1,200	18
Somers Mfg. Co., Waterbury, Conn.	Annealing brass	1	150	150	18
Lorain Steel Co., Johnstown, Pa.	Annealing bolts	1	200	200	24
Ingram Richardson Mfg. Co., Beaver Falls, Pa.	Enameling steel signs, stove parts, etc.	1	600	600	48
Name withheld	Annealing steel	1	360	360	24
		34		16,066	806

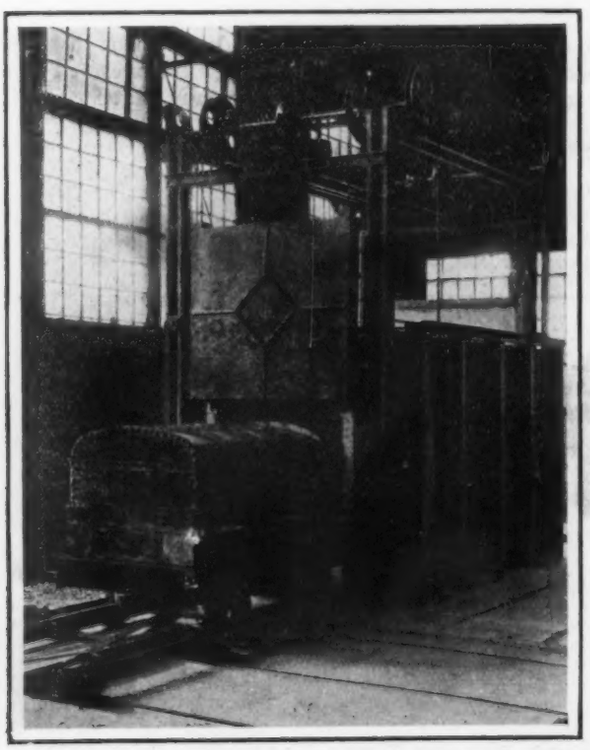
One 600-kw. furnace is in use by the Stavanger Electro Staalverk, Stavanger, Norway, for annealing steel castings.
*Described in THE IRON AGE, Feb. 27, 1919.
**Described in THE IRON AGE, June 30, 1921.



A Continuous Conveyor Type (Hagan) of Electric Furnace for Bright Annealing. It is provided with water seal at both ends and the automatic control and temperature recording instruments are at the left

first undertook this work early in 1917 when it developed the vertical cylindrical furnace for heat-treating large gun forgings. The company never did and does not now actually build and install large furnaces but it does manufacture and supply the metallic resistor heating units with refractory insulator supports for installation in the furnace as well as the automatic temperature control consisting of contractor panels operated by Leeds & Northrup controller instruments or in some cases recording controllers.

One of the illustrations shows four gun forgings being lowered into a battery of four furnaces in the plant of the Tioga Steel & Iron Co., Philadelphia. There were installed during the war 22 of these gun furnaces in the following ordnance plants: Tioga Steel & Iron Co., Philadelphia; Inland Ordnance Co., Rochester, N. Y.; Syminton Anderson Co., Rochester, N. Y.; Watertown Arsenal, Watertown, Mass.; U. S. Naval Ordnance Plant, South Charleston, W. Va. These furnaces ranged from 6 ft. in diameter by 11 ft. deep, consuming 200 kw., to 7 ft. in diameter by 35 ft. deep, consuming 700 kw. A large furnace of this type is at present under construction in a Government ordnance plant having dimensions of 8 to 10 ft. in diameter by 105 ft. deep with a connected load of 2700 kw.



This Is a 210-Kw. Electric Annealing Furnace for Annealing Sheet Steel, the Charge Consisting of 16,000 Lb. The furnace is 12 ft. long, 4 ft. 6 in. wide and 3 ft. high and is a product of the George J. Hagan Co., Pittsburgh

With the ending of the war, the company states that its efforts were directed to modifying the design of the gun furnace so as to secure one which would be suitable for peace time needs on a commercial basis. One of the illustrations shows this later type. In it the units consist of heavy metallic windings supported in refractory insulators on the inner walls of the furnace chamber. The pitch and length of the ribbon convolutions can be made so as to concentrate or distribute the heating effect as desired. Such ribbon units can be placed in the hearth or floor of the furnace or under the arch.

One of the tables gives a list of some of the more important metallic resistor type of heat-treating furnaces in commercial use as equipped with G. E. heating units and temperature control. Some were installed and built by furnace building companies and others were installed by the company using them. The General Electric Co. also builds three or four furnaces of this type of relatively smaller size or of such size that the furnace can be built up complete at the plant and shipped to the user in that condition.

Besides the Baily and General Electric heat-treating furnaces there are four other companies which have introduced or are introducing commercial furnaces for heat-treatment as follows:

The George J. Hagan Co., Pittsburgh, has the following installations either made or under contract as follows:

Fowler & Union Horsenail Co., Buffalo:

One 24 ft. regenerative car type furnace having a connected load of 180 kw for operation on 440 volts, 3-phase, 60-cycle power service.

This furnace is used for annealing special steel wire in coil form.

Nash Motors Co., Kenosha, Wis.:

One large rotary furnace, 20 ft. in diameter and having a connected load of 270 kw for operation on 440 volts, 3-phase, 60-cycle power service.

This furnace is used for hardening, annealing and carbonizing automobile parts, varying from a spring clip to a front axle. A description of this installation appears elsewhere in this issue.

Ontario Silver Co., Muncie, Ind.:

One continuous annealing furnace for annealing brass and nickel silver flat ware.

This furnace has a connected load of 75 kw for operation on 220 volts, 3-phase, 60-cycle power service.

Standard Stoker Co., Inc., Erie, Pa.:

One box type annealing furnace having a connected load of 40 kw for operation on 220 volts, single-phase, 60-cycle power service.

This furnace is used for annealing miscellaneous steel castings.

Canadian Allis Chalmers Co., Toronto, Ont.:

One car type sheet annealing furnace having a connected load of 210 kw for operation on 440 volts, 3-phase, 60-cycle power service.

This furnace is used exclusively for annealing special transformer steel in sheet form.

Illinois Watch Co., Springfield, Ill.:

One small rotary enameling furnace, 6 ft. in diameter having a connected load of 31 kw for operation on 220 volts, 3-phase, 60-cycle power service.

The furnace is used exclusively for enameling watch dials.

Cooley Mfg. Co., Cicero, Ill.:

One double end enameling furnace 225 kw connected for operation on 220 volts, 3-phase, 60-cycle power service.

The furnace is to be used for enameling cooking utensils.

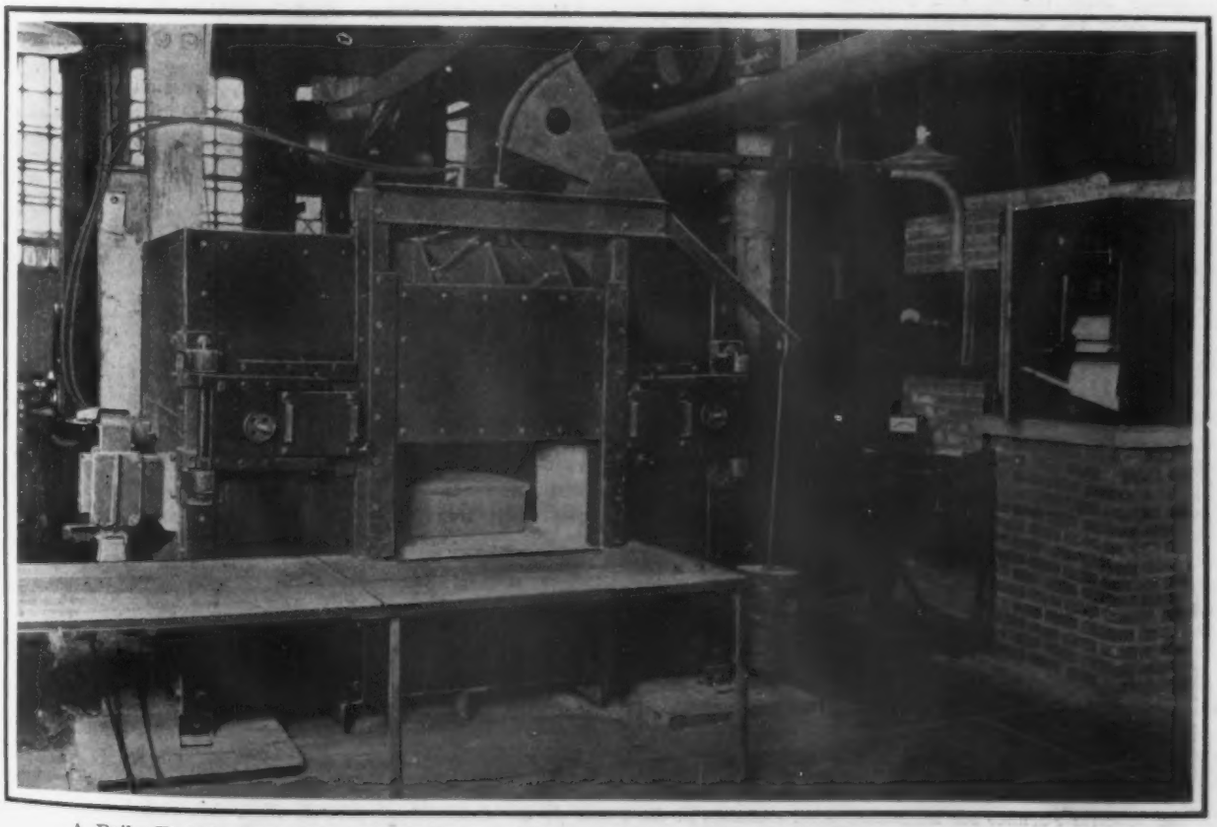
Total furnaces, 7; of which 5 are treating steel.

Holcroft & Co., Detroit, Mich., have already installed or contracted for the following electric heat-treating furnaces:

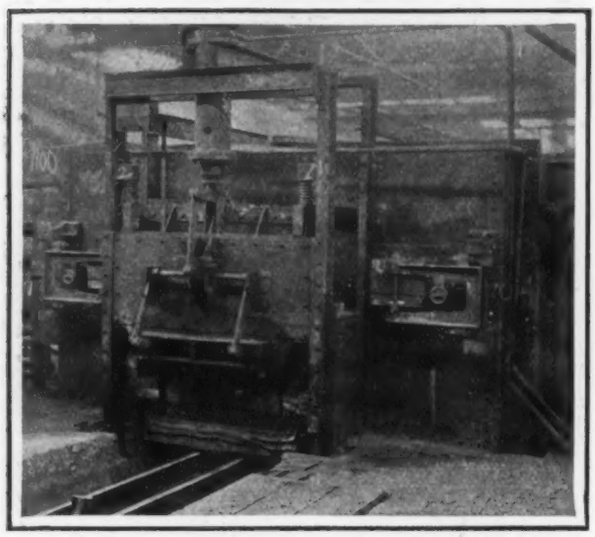
An Electric Carburizing Furnace Furnished by the General Electric Co. to the Standard Equipment Co., Cleveland, for Carburizing Gears and Roller Bearings and Heat Treating Ring Gears

Packard Motor Car Co., Detroit:

Eight (8) furnaces, 2 ft. wide, 2 ft. high, 6 ft. long, 80 kw each.



A Baily Electric Furnace for Heat Treating Bolts at the Plant of the Lamson & Sessions Co., Cleveland



A Baily Electric Heat-Treating Furnace of the Car Type
Operating at the Pittsburgh Plant of the Crucible Steel Co. of America

Hardening and drawing crankshafts, 500 lb. and 800 lb. per hour respectively.

Schwartz Hermann Co., Sommerville, N. J.:
One furnace, 2 ft. wide, 8 in. high, 7 ft. 4 in. long, 68 kw and one furnace 2 ft. wide, 8 in. high, 6 ft. long, 32 kw.
Hardening and drawing 500 lb. of temper spring steel per hour.

General Motors Laboratory, Dayton, Ohio:
One furnace, 2 ft. wide, 5 ft. 6 in. long, 15 in. high, 31 kw.
General heat treating, 300 lb. per hour.
Total furnaces, 10; all treating steel.

The Electric Furnace Construction Co., Philadelphia, has, already installed or under contract, the following electric heat-treating furnaces:

Emery Steel Casting Co., Baltimore:
One pit type annealing furnace and soaking pit for small steel castings. The same company also has an electrically heated core drying oven finished by the same builders.

Yale & Towne Mfg. Co., Stamford, Conn.:
One electric recuperative car type furnace, 60 ft. long, 12 ft. wide and 11 ft. high, 180 kva.
It is used for annealing gray iron.

The same company has also sold to the Sociedad Espanola Construccion Naval, Rheinosa, Spain, one furnace, 6 ft. dia., 37 ft. deep, 712 kw. for heat treating 6000 lb. of gun forgings per hour and one furnace, 10 ft. 6 in wide, 7 ft. high, 20 ft. long, for annealing 5500 lb. of gun forgings per hour.

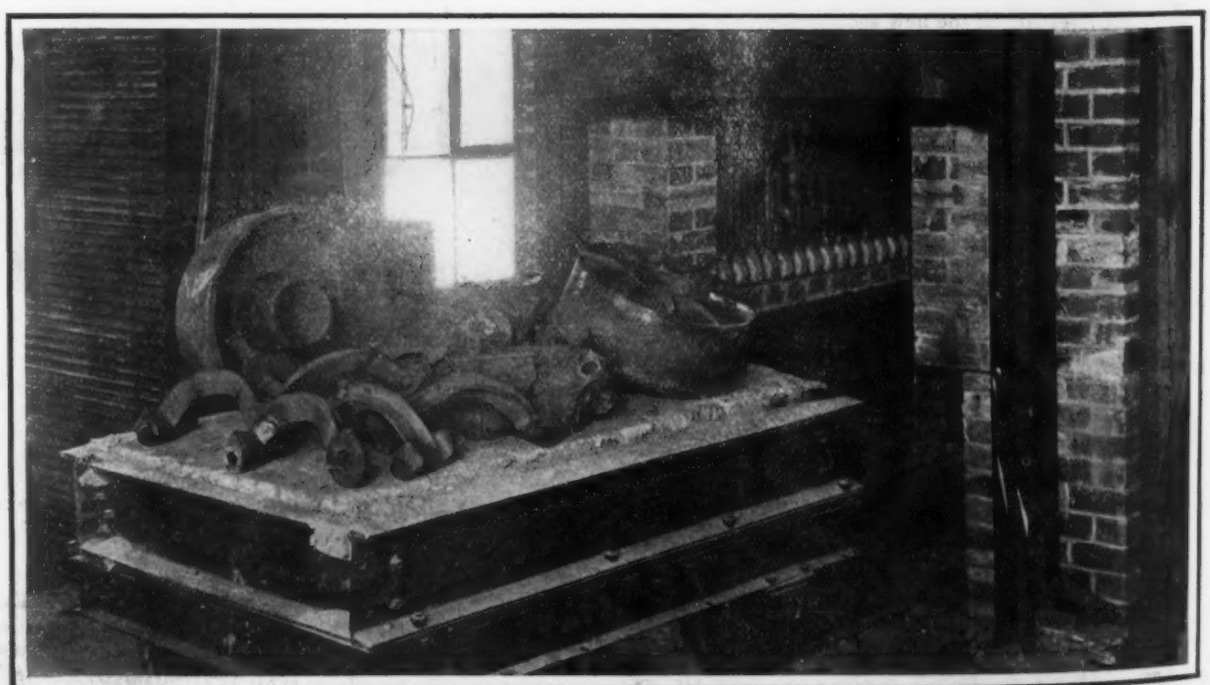
Another company, the American Industrial Furnace Corporation, Boston, has made installations of electric heat-treating furnaces as follows:

Connecticut Broach Co., New London, Conn.:
One furnace, 9 in. wide, 2 ft. high, 5 ft. long, 25 kw.
For hardening and drawing 200 lb. of broaches per hour.

Chapman Valve Co., Indian Orchard, Mass.:
One furnace, 5 ft. wide, 4 ft. high, 6 ft. 10 in. 120 kw.
Annealing 800 lb. of steel and brass castings per hour.

A review of this subject should not close without reference to the electrical heat treatment of alloy steel tubing as carried out by the Snead & Co. Iron Works, Jersey City, N. J., a description of which appeared in THE IRON AGE, Jan. 22, 1920, and which has recently been presented as a moving picture before various technical societies. While the apparatus is not distinctly a furnace, it is a novel and highly successful method of heat treating tubing and gives promise of being applied more generally.

The foregoing analysis, when summarized, presents a striking total of heat-treating furnaces using electricity as a source of heat. In the steel field alone there are about 80 such furnaces now installed or contracted for. They are operating on many kinds of products, including steel and iron castings, automobile parts, tool steel, sheets, etc. At least seven furnaces are operating on non-ferrous material and the application to glass and other industries is growing. It is also of interest that there are already several installations of American electric heat-treating furnaces in foreign countries: Canada, France, Spain, Norway, etc.



An Electric Furnace for Annealing Steel Castings at the Plant of the Connecticut Electric Steel Co., Hartford, Conn. Its capacity is 3000 lb. of castings every 12 hr., including one hour soaking period

Steel Treaters Meeting in Indianapolis

Third Annual Convention and Exhibition Next Week in a Large Heat-Treating and Industrial Center—Program and Exhibits

WHEN the American Society for Steel Treating meets in Indianapolis, Ind., next week, Sept. 19 to 24, for its third annual convention and exhibition, it will mark the anniversary of the amalgamation into one large organization of two heat-treating societies. This was accomplished at the second annual convention in Philadelphia last September.

The past year has been a remarkably successful one for the organization. Membership has increased in numbers and an increase in service as well as one in financial assets has been registered. When the American Steel Treaters' Society and the Steel Treating Research Society were amalgamated last year, the combined membership was close to 2750. The membership of the new society on Sept. 1 was 3237, or an increase of 487.

Since the last convention four new chapters have been organized: At Syracuse, N. Y.; Charleston, W. Va.; Gary, Ind., and Worcester, Mass., making a total of 31. Practically all chapters have reported excellent attendance at their monthly meetings during the past winter, and all of them have made extensive plans and preparations for the coming year. The average attendance at the meetings of each of the chapters has been approximately 100 members and guests, which means that there are 3000 individuals attending meetings of the whole organization each month, with a total attendance of over 30,000 for the year.

One of the most important developments of the society during the past year has been the increased value of its publication, the *Transactions*. The general make-up and appearance have been improved while the number of pages has been increased. Over 775 pages of reading matter, exclusive of advertising, have been published in the 12 numbers since last September.

Since the amalgamation, two nationally prominent men have been elected to and accepted honorary memberships. They are Dr. Albert Sauveur, head of the department of metallurgy of Harvard University, and Dr. Edward D. Cambell, head of the department of chemistry, University of Michigan, Ann Arbor, Mich. This makes a total of four honorary members, Sir Robert Hadfield and Dr. Henry M. Howe having been previously elected. The national standing committees have held meetings during the past year and have contributed valuable results toward increasing the efficacy of the society and toward the preparation of the research program and standards for heat treating.

There are a number of causes contributing to the success of the society, one of the most important being decentralization of organization, or that of having many chapters located in industrial centers, easy of access and of greatest benefit to the members. The large portion of the dues, which the constitution provides, should remain with local chapters for payment of expenses incident to securing speakers and sending announcements, etc., has placed the chapters in a sound financial condition with money in their local treasuries to insure active participation in the aims and purposes of the society.

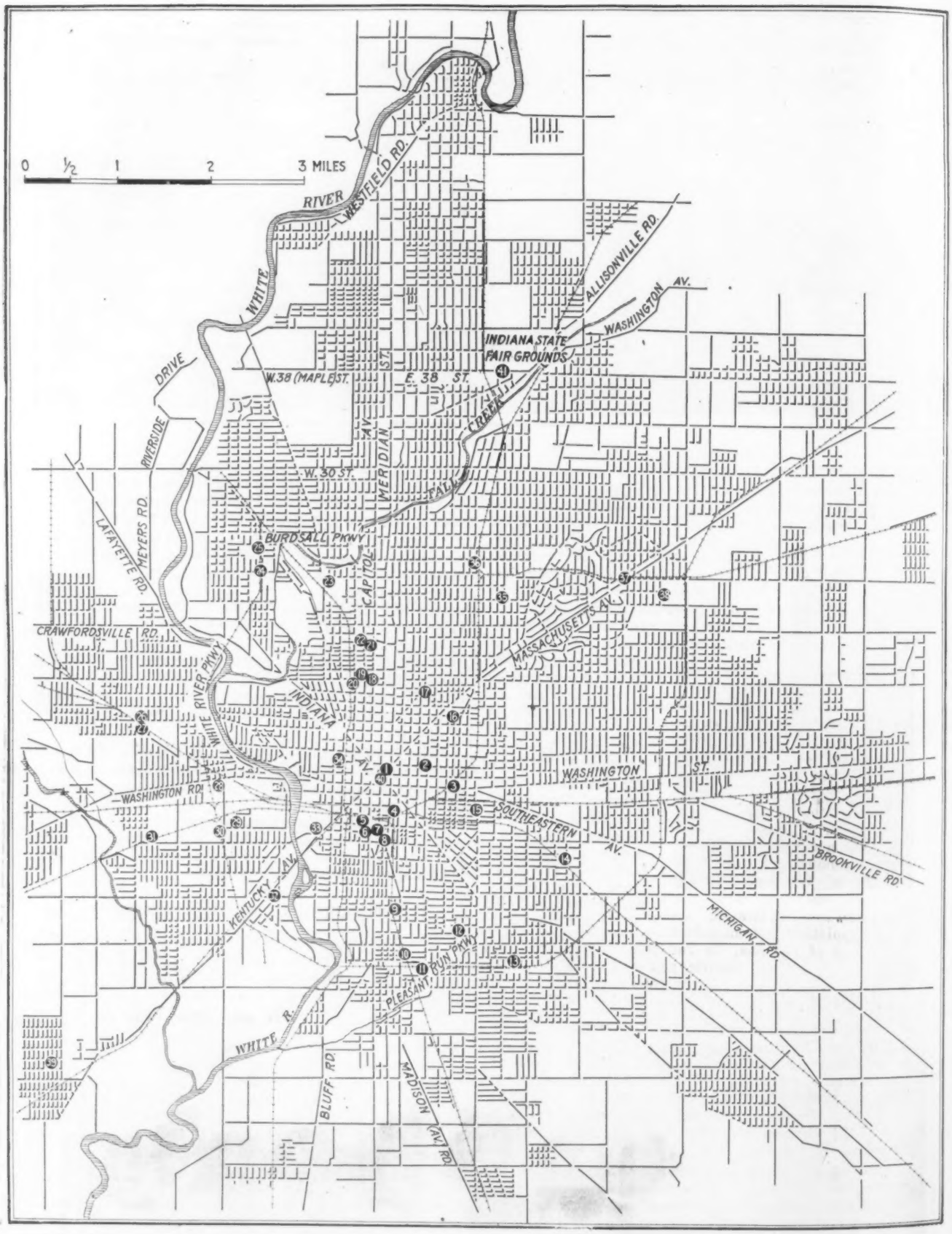
The national president, Lt.-Col. A. E. White, has visited all of the chapters of the society the past winter and has traveled over 10,000 miles, using over six weeks of his time and thus giving to the entire membership a portion of his enthusiasm, his counsel and his advice. The officers of the society believe that it has as yet made but a small impression upon the field of possible members and of its potential usefulness.

Indianapolis and Its Industries

The location selected for the annual meeting this year is one of the important heat-treating centers of the country. The map, reproduced on another page, shows the location of the leading places where heat treating of various kinds is being practiced, as well as the location of the Indiana State Fair Grounds where the convention and exhibition are to be held.

Indianapolis is fast coming to the front as a manufacturing city and to-day it has over 1200 industries, manufacturing some 800 different products. The city is located within 50 miles of the center of population of the United States and claims to be the geographical center of manufacturing. It is, in population, transportation facilities and volume of business transacted, the largest inland city not on a navigable stream in the United States. The population numbers approximately 315,000; 82 per cent of this are native born whites, and 2,000,000 live within 100 miles of the city. In the city itself, 146,000 were listed at the last census as engaged in gainful occupations. There are over 70,000 families, of which 65 per cent own their own homes.

The city has direct railroad connection with all parts of the country by means of 17 railroads. Every-one of these is served by a belt railroad, 14 miles in length, which surrounds the city and gives industrial plants ready access to each radiating line. In addition to the steam railroads electric interurban lines, radiating from Indianapolis, comprise one of the most ex-



tensive systems in the United States. There are 13 of these lines, and the number of passengers passing through the terminal station each day numbers approximately 21,000.

The metal working industry is steadily gaining in importance, being second only in volume to the packing industry. The manufacture of automobiles is the leader in the metal trades, and the city is claimed to be second only to Detroit in the number of automobiles built. There are 10 automobile manufacturing plants within the city limits. Manufacture of automobile parts, including drop forgings, body sheets, carburetors, gears, bodies, springs, fans, radiators, etc., all go to make it one of importance in the automotive field.

While the automobile industry is undoubtedly of first importance, Indianapolis has a large number of other metal-working industries that go to make it one of the leaders among the cities of the country. Perhaps the most important of these is the manufacture of chain transmissions and sprockets. The city is also a leader in the manufacture of saws, having one of the largest plants in the country. The machine tool industry is assuming greater proportions and several large companies are now operating there. Among other products

The map on the opposite page shows by numbers the location of some of the Indianapolis plants where heat treating is practiced. The lists below are a key to the map.

Numerical Finding List

No.
1.—General Tool & Gauge Co.
2.—Specialty Gauge & Tool Co.
3.—Cole Motor Car Co.
4.—Modern Tool & Die Co.
5.—Indianapolis Tool & Mfg. Co.
6.—B. C. Atkins & Co.
7.—American High-Speed Chain Co.
8.—Spacke Machine & Tool Co.
9.—Indianapolis Drop Forge Co.
10.—Marschke Mfg. Co.
11.—American Can Co.
12.—Stevenson Gear Co.
13.—Robt. H. Hassler, Inc.
14.—Service Spring Co.
15.—Weidely Motors Co.
16.—Frontenac Motor Co.
17.—Modern Electric & Machine Co.
18.—Stutz Motor Car Co. of America, Inc.
19.—Ott Grinder Co.
20.—Dean Bros. Steam Pump Works.
21.—Stutz Fire Engine Co.
22.—H. C. S. Motor Car Co.
23.—Fairbanks, Morse & Co.
24.—International Machine Tool Co.
25.—Milholland Machine Co.
26.—National Malleable Castings Co.
27.—Link-Belt Co.
28.—Duesenberg Automobile & Motors Co.
29.—Metal Auto Parts Co.
30.—Imperial Drop Forge Co.
31.—Chandler & Taylor Co.
32.—Nordyke & Marmon Co.
33.—Diamond Chain & Mfg. Co.
34.—Zenite Metal Co.
35.—Midwest Engine Co.
36.—National Motor Car & Vehicle Corporation.
37.—Oakes Co.
38.—Premier Motor Corporation.
39.—Lafayette Motors Co.
40.—Monument Circle.
41.—Indiana State Fair Grounds.

Alphabetical Finding Index

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American Can Co., Garfield Park car	11
American High Speed Chain Co., South Meridian, Stock Yards or Garfield car	7
Atkins, E. C., & Co., South Meridian, Stock Yards or Garfield car	6
Chandler & Taylor Co., West Indianapolis or Terre Haute Traction car	31
Cole Motor Car Co., East Washington car	3
Dean Bros. Steam Pump Works, Northwestern car	20
Diamond Chain & Mfg. Co., West Indianapolis car or Stock Yards car	33
Duesenberg Automobile & Motors Co., West Washington car	28
Fairbanks, Morse & Co., Northwestern car	23
Frontenac Motor Co., East Tenth Street or East Michigan car	16
General Tool & Gauge Co., East Michigan car	1
Hassler, Robt. H., Inc., Virginia Avenue car, transfer to Minnesota	13
Imperial Drop Forge Co., West Indianapolis car or Terre Haute traction	30
Indianapolis Drop Forge Co., Garfield Park car	99
Indiana State Fair Grounds, Central and College cars	41
Indianapolis Tool & Mfg. Co., South Meridian car	5
International Machine Tool Co., Riverside car	24
Lafayette Motors Co., West Indianapolis car marked "Mars Hill" or Martinsville traction	39
Link-Belt Co., West Michigan car	27
Marschke Mfg. Co., Garfield Park car	10
Metal Auto Parts Co., West Indianapolis car	29
Midwest Engine Co., Columbia car	35
Milholland Machine Co., Riverside car	25
Modern Electric & Machine Co., Central car	17
Modern Tool & Die Co., three blocks from monument	4
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National Motor Car & Vehicle Corporation, College car	36
Nordyke & Marmon Co., Stock Yards car	32
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Premier Motor Corporation, Brookside car	38
Service Spring Co., English car	14
Spacke Machine & Tool Co., South Meridian or Garfield car	88
Specialty Gauge & Tool Co., East Washington and East Michigan cars	2
Stevenson Gear Co., East Washington car	12
Stutz Fire Engine Co., Illinois car	21
Stutz Motor Car Co. of America, Inc., Illinois car	18
Weidely Motors Co., East Washington car	15
Zenite Metal Co., West Michigan car	34

manufactured are oil and gas engines, road building machinery, gray iron and steel castings, steam engines and boilers, freight cars, concrete machinery, hoisting derricks, small tools, metal stampings and electrical apparatus of various kinds. To supply the needs of the various industries, a larger stock of iron and steel is carried by jobbers than in any city in the Middle West, outside of Chicago.

The Chamber of Commerce, through its industrial division, is conducting a never-ceasing campaign for new industries. While no bonuses are offered to bring industries to the city, its natural advantages are stressed, such as its location with reference to the center of population and manufacture, its nearness to the coal fields of Indiana, its railroad facilities and unusually low rates for electric power and artificial gas and the excellence of its labor conditions.

The city is essentially an "open-shop" city. In the metal trades it is practically 100 per cent open and the city as a whole shows an average of 90 per cent of its industries working without union agreements. In the Associated Employers of Indianapolis, the city has an asset in coping with the labor problem. This association today has over 500 members, with employees numbering approximately 46,000. It was organized in 1904, the object being civic, economic and commercial betterment. The fundamental principles of the association's activities are first, securing of harmonious industrial relations between the employer and employee, and insistence on adequate compensation and timely advancement for the employee as measured by his individual efforts; second, unalterable opposition to the principle of the closed shop as un-American, illegal and unfair to the independent workmen, the employer and the public; third, strenuous opposition to strikes, lockouts, boycotts and kindred evils; and fourth, the impartial enforcement of law and strict maintenance of order. The association was one of

The Famous Speedway at Indianapolis Where Special Automobile Races Will Be Staged on Wednesday Morning, Sept. 21, for the Entertainment of the Steel Treaters and Their Guests

the first in the country to carry on an organized systematic campaign of education in industrial matters. It has already distributed hundreds of thousands of pieces of educational and instructive literature, not only to its own mailing list of 2000 business men and employers of labor, but also to public and professional men, clergymen and officers in public service in federal, state, county and municipal government.

There are many points of interest about the city, chief among which are the soldiers and sailors, monument and the motor speedway. The new union station, with its system of elevated tracks, is impressive, over 20,000 tons of steel having been used in its construction. In addition, the city has excellent educational facilities and a system of public parks.

Exhibition and Convention Program

The regular exhibition of heat-treating appliances and processes will be held, in connection with the convention, at the manufacturers building, Indiana, State Fair Grounds. In spite of the business depression, the society has been fortunate in securing a large list of exhibitors who will display the latest and most efficient products and equipment used in heat-treating. A complete report of the exhibitors and what they will show is found elsewhere.

A technical program of 78 papers is scheduled for the convention. A list of the authors and their subjects were printed in THE IRON AGE, Sept. 1. The sessions will be held in the Woman's Building, located close to the exhibition and for the first time there will be simultaneous meetings. The general program for each day follows:

Monday, Sept. 19—Opening Session, 2 p. m.

Address of welcome.....
W. R. Chapin, chairman executive committee, Indianapolis chapter
Welcome to Indianapolis.....City official
Response.....A. E. White, National President
Report of tellers of election.....R. T. Bayless, Chairman
Report of secretary....W. H. Eisenman, National Secretary
Report of treasurer.....W. S. Bidle, National Treasurer
President's address.....A. E. White, National President
Announcements.

Tuesday, Sept. 20

10 a. m.—Papers on carburizing.
2 p. m.—Papers on tool steel.
6 p. m.—Smoker and entertainment.

Wednesday, Sept. 21

10 a. m.—Motor Speedway. 50-mile match race between Duesenberg and Frontenac motor cars.
2 p. m.—Room A: Papers on heat treating equipment. Room B: Papers on alloy steel.
8 p. m.—Dance and entertainment.

Thursday, Sept. 22

10 a. m.—Room A: Program in charge of the Army and Navy. Room B: Papers on alloy steel.
2 p. m.—Room A: Papers on metallographic research. Room B: Papers on heat treating equipment.
6 p. m.—Annual banquet; speakers of national prominence.

Friday, Sept. 23

10 a. m.—Research session in charge of Dr. Harrison E. Howe, chairman National Research Council, Washington, D. C.
2 p. m.—Room A: Papers on heat-treating problems. Room B: Papers on shop management.

Special attention is called to the fact that owing to the large number of excellent and interesting papers, simultaneous sessions will be held on three days of the Convention so that visitors may have the opportunity of attending the sessions which are of the greatest interest.

Army and Navy Session

The Army and Navy Session on Thursday morning will be especially interesting and the following general program will be presented.

The Navy will detail an officer to present a paper on "Laying of the North Sea Barage."

General Amos A. Fries, chief of chemical warfare service, will have a paper presented on some subject of interest to the members.

General C. C. Williams, chief of the ordnance department, has asked F. C. Langenberg, metallurgist Watertown Arsenal, to present a paper on heat treatment at the Arsenal.

Major L. W. McIntosh, assistant to the chief of engineering division, air service, war department, will have a paper presented on "Heat-Treating Problems in Aeronautics."

Research Session

Dr. Harrison E. Howe, chairman of the National Research Council, will preside at the research session on Friday morning. Dr. Howe has consented to secure the speakers for that session, in which the general plan for research in heat treatment will be presented and discussed.

The Exhibitors and Their Exhibits

A

ALCORN, BLOCKHOUSE & Co., Philadelphia—Exhibiting a combination conveyor type furnace, electrically heated, which combines in one the conveyor for such articles as crank shafts, cam shafts, rear axle shafts, and also conveying miscellaneous small pieces, such as rounds, shapes, gears and gear blanks. This furnace was originally designed for the heat treatment of shells, principally 155 mm., and it was eventually adopted by the Ordnance Department as standard equipment. James S. Alcorn and H. M. Austin will demonstrate the furnace.

ARMSTRONG CORK Co., Pittsburgh—Exhibiting the following "Nonpareil" products: insulating brick for all kinds of ovens, furnaces, etc.; high pressure covering and blocks for steam lines, enameling and japanning ovens, feed water heaters, etc.; corkboard for the insulation of cold storage and constant temperature rooms; cork covering for refrigerated drinking water lines, brine and ammonia lines, etc.; also "Circle A" cork brick for floors; an electrically heated furnace will demonstrate the heat retarding properties of "Nonpareil" insulating brick. Represented by J. T. Gower, Cincinnati office.

E. C. ATKINS & Co., Indianapolis—Atkins saws of all kinds, also machine knives, metal cutting machinery, hack saw blades, frames, etc.; also process samples of hand saws from raw material to finished product. Represented by T. A. Carroll, J. E. Andrews, E. C. Drake, T. E. Patton, Robert Arbuckle and Edward Norvell.

ATLAS CRUCIBLE STEEL Co., Dunkirk, N. Y.—Samples of various types of tool steel, including both hot rolled and cold rolled shapes; there will also be an exhibit of fractures, showing the effect of proper and improper heat treatment on the various types of tool steel. Products of the company's high speed drop forging plant, which produces various sizes of blanks for key-way cutters, end-mills and cutters will also be shown. Represented by F. G. Davis, assistant general sales manager; J. A. Disney, sales representative; W. C. Peterson, metallurgical engineer, and F. Kremp, metallurgist.

B

BAUSCH & LOMB OPTICAL Co., Rochester, N. Y.—Metallographic and metallurgical equipment, including microscopes, photomicrographic apparatus and accessories, including new complete metallographic outfits, one of them having the microscope built in as part of the equipment. Represented by W. L. Patterson and I. L. Nixon, both from Rochester.

BELL & GOSSETT Co., Chicago—Exhibiting "Caseite," used in place of cyanide, in either lump or powder form; "Bathite," which is a salts for preheating steel between 1200 and 1600 deg. Fahr., used as a substitute for lead; "Cleancoat," a carbonacious compound used on the top of lead to prevent drossing and oxidation, being a substitute for charcoal; also carbonizing compound, carbonizing pots and boxes (steel and alloy), "Enamelite" (selective hardening material), high temperature cements, quenching and tempering oils, scleroscopes and prestometers.

BETHLEHEM STEEL Co., Bethlehem, Pa.—A feature will be a large illuminated transparency consisting of 32 colored views, showing the various processes of steel manufacture from raw material to finished product; another transparency consisting of charts showing the physical properties of 48 of the standard grades of alloy and carbon steels. The charts include the tensile and hardness results of these steels in their condition as rolled, annealed and after various special heat treatments. Another chart shows physical test diagram, micrographs, fractures, etc., illustrating the effect of quenching steel at the proper and improper temperatures. Products exhibited to include a number of special iron castings made with Mayari iron; an I beam section taken progressively through the various punching, blanking and bending operations in the manufacture of the new Bethlehem structural steel wheels for motor trucks and a representative line of small tools made from Bethlehem tool steel, drop forgings, hardened steel rolls and bolts and nuts. Represented by W. R. Shimer,

sales metallurgist, W. H. Laury, John Moran, W. C. Cutler and Robert MacDonald, all of Bethlehem office.

BRISTOL Co., Waterbury, Conn.—Entire line of Bristol indicating and recording pyrometers, including temperature controllers, together with accessories for these classes of instruments. Exhibit in charge of H. G. Hall, Chicago district sales manager, and H. L. Griggs, general sales manager.

BROWN INSTRUMENT Co., Philadelphia—Apparatus to demonstrate what the research departments of instrument manufacturers are doing today, along the lines of developing newer and more accurate instruments; at this booth will be displayed a potentiometer, so compact that it can be carried under the arm, and yet has a scale of 96 in. long; automatic control showing what has been accomplished during the last year; the heating cycle controller; new cold junction compensated pyrometer, together with the complete line of high resistance indicating and recording pyrometers of single continuous and multiple types; indicating and recording thermometers; indicating and recording pressure gages; tachometers; and all types of instruments for temperature measure and recording. In charge of booth: G. W. Keller, C. C. McDermott, D. J. Jones, R. W. Mayer, E. R. Robinson, and S. C. Ketterer.

BUREAU OF STANDARDS, UNITED STATES DEPARTMENT OF COMMERCE—General equipment available for research and the testing of metals at the Bureau of Standards, shown by transparencies and photographs; copies of publications considered of interest to members will be available for examination. Among the items of interest are the production of pure metals, such as iron and the preparation of gas free alloys, together with the melting of different industrial ferrous and non-ferrous metals by various methods. In connection with this work, methods developed for the determination of gases in metals will be shown. Such investigations which have been pursued intensively for several years at the Bureau of Standards are fundamental, and their perfection must necessarily be achieved before the effects of various gases contained in alloys, such as steels manufactured by various processes, may be determined. Hot and cold working of metals, their heat-treatment and testing, including some applications of the 2,300,000 lb. Emery testing machine, will likewise be exhibited. There will be included the results of recent studies of the properties of metals at high temperatures, including compression tests of different types of bearing metals and tensile tests of carbon and alloy steels under different conditions of rolling and heat-treatment, and applications of magnetic analysis and such special studies as the distribution of stresses in chilled iron and steel car wheels under conditions approximating those of service. The exhibit, as a whole, will illustrate the field of co-operation of the bureau with the metal industries. Dr. G. K. Burgess, H. J. French, and J. S. Vanick, and Miss D. E. Kingsbury will attend.

C

CASE HARDENING SERVICE Co., Cleveland — Exhibiting "Bohnite" and samples of the work which it has produced in the form of gears, cam shafts, etc., cut to show the cross section and polished and etched to show the depth of case; also two machines for testing the hardness of metals, the auto-punch and a quadrant sclerometer, both manufactured by the Rudge-Whitworth, Ltd., Birmingham, England, to be shown for the first time in the United States. Represented by William H. Bell and C. E. Lovejoy.

CELITE PRODUCTS Co., New York—"Sil-O-Cel" Insulating brick, insulating powder, insulating cements, high temperature cements and other products. There will be two demonstrations, one of an electric furnace with standard fire brick used as refractory, three sides and top insulated with "Sil-O-Cel" standard brick and the remaining side uninsulated; furnace will be equipped with pyrometer to show internal heat and thermometers to show temperature difference between walls insulated with "Sil-O-Cel" standard brick and uninsulated walls. The second demonstration will show the heat-resisting qualities of "Sil-O-Cel" brick by means of a blow torch. Represented by Edward F. Davis, H. N. Haberstroh and S. M. Jenkins.

CENTRAL STEEL Co., Massillon, Ohio—Automobile parts made from alloy steel; also a demonstration of the use of the company's oil hardening UMA steels on a gear cutting machine; will also exhibit seamless tubing and cold drawn products made from the company's steels. Represented by F. J. Griffiths, D. N. A. Blacet, L. B. Baker and C. P. Richter.

COLONIAL STEEL Co., Pittsburgh—Exhibiting Colonial high-speed and carbon tool steels, showing fractures and photographs. Represented by Charles M. Brown, vice-president; James E. Barry, special representative; G. W. Hampshire, Detroit representative; Charles Kopenhoefer, Cincinnati and Indianapolis representative; N. B. Hoffman, chief chemist and metallurgist; T. Howe Nimick, assistant to the vice-president.

CRUCIBLE STEEL Co. OF AMERICA, Pittsburgh—Heat treated steel products of various kinds. Represented by J. W. Taylor and F. J. White, Pittsburgh, and C. W. Mayer and H. L. Raynor, Indianapolis, Ind.

D

DEEDS COMMERCIAL LABORATORIES, Indianapolis, Ind.—Carburizing compound, demonstrating methods of use as well as the principle of quenching. Represented by W. C. Horner.

DEEDS & CHAPIN, Indianapolis—"Cinch" Steel Cement, and various dies, tools, and other articles which have been cemented with their products.

DRIVER-HARRIS Co., Harrison, N. J.—Cast Nichrome carbonizing containers of the most popular styles. Represented by H. D. McKinney; L. O. Hart, second vice-president; C. B. Callomon, factory superintendent; F. L. Driver, third vice-president; W. E. Blythe, H. O. Hartdegan and G. A. Rickert, advertising manager.

E

ELECTRIC ALLOY STEEL Co., Youngstown, Ohio—A complete assortment of its various grades of high-speed steel; several tools from its steels which have performed extraordinary feats; a large sample case showing fractured bars in the natural, annealed and hardened, or heat-treated condition in each grade of tool and high speed steel; this sample board shows the grain structure of various degrees of hardness of each of the grades; a complete set of micrographs, showing the cleanness of its cold melt electric furnace steels as well as its crucible cast high-speed steels. Represented by G. Peterson, general manager of sales; G. W. Morrison, general superintendent; J. E. Sandmeyer, field metallurgist, and M. A. Grossmann, chief metallurgist.

ELECTRIC STEEL Co. OF INDIANA, Indianapolis.

ELECTRICAL REFRACTORIES Co., East Palestine, Ohio—Refractories for electric ranges and steel treating furnaces, consisting of electric heating element supports of various types and linings for the same. The products are confined to use in resistance type electric heating devices, where heat up to 2500 deg. is attained. Represented by F. E. Owen, president.

CHARLES ENGELHARD, INC., New York—A complete line of indicating and recording pyrometers and automatic control apparatus. Various forms of thermo-couple mountings will also be shown, particularly Impervite refractory and Impervite hard porcelain tubes. Represented by E. S. Newcomb and G. V. Nightingale.

F

J. B. FORD Co., Wyandotte, Mich.—Chemicals, and cleaning compounds for the hardening room.

G

WILLIAM GANSCHOW Co., Chicago—Exhibiting heat-treated gears and other gears. Represented by A. F. Boissoneau.

GENERAL ALLOYS Co., Chicago—Heat resisting alloys. Represented by H. H. Harris, A. D. Heath, A. L. Grinnell, P. F. McGovern and O. A. Parine.

GENERAL ELECTRIC Co., Schenectady, N. Y.—An oil-tempering bath and a new type of semi-cylindrical furnace for treating carbon steel will be shown. The latter is a new development, being a small furnace whose special features are declared to be its rapid heating, the low voltage required, the strength of construction, especially as regards the heating element, and the accurate control of the temperature. The oil-tempering bath is one of standard construction such as has been built by the company for some time. Represented by C. L. Ipsen, E. F. Collins and C. T. McLaughlin.

H

GEORGE J. HAGAN Co., Pittsburgh—One electric furnace and one combustion furnace, both in operation, together with furnace accessories. The electric furnace is of the ribbon register type, with full automatic temperature control; the combustion furnace is designed for either oil or gas operation, equipped with a Brown automatic temperature control mechanism. Represented by George J. Hagan, Howard G. Hammer, W. C. Buell, Jr., H. C. Adams, R. E. Talley, Alan D. Dauch, F. W. Robertson and O. P. Luetscher.

HALCOMB STEEL Co., Syracuse, N. Y.—Exhibiting a large board showing the steps taken in its mill from the ingot to the finished form, such as hammering bars,

rings, disks, blocks, etc., rolled sheet mill and wire mill products; fractures from bars of all of its tool steels, accompanied by cards showing the principal uses for each grade, including "Dreadnought" high speed steel, "Ketos" oil hardening tool steel, special brands such as "Liberty," "Pyro" die, "Halco," stainless, special vanadium and ordinary carbon tool steels; tensile test pieces of alloy steel, showing the physical properties which may be developed by various heat treatments; also the principal uses in the automotive, aeroplane and motor-truck industries in which these special "Halectralloy" brand steels are used.

HEPPENSTALL FORGE & KNIFE CO., Pittsburgh—Interior and exterior views of the company's plants; nickel steel piston rods, shear knives, die blocks; two racks of drop forgings, made from some of the company's die blocks; data giving the number of forgings of each design that its blocks have made. Represented by J. A. Succop, metallurgical engineer; C. W. Heppenstall, treasurer and general manager.

HOSKINS MFG. CO., Detroit—An electric furnace in operation, using a new type of heating element and controlled automatically by a temperature regulator employing a new principle; also indicating and recording pyrometers and a display of nickel-chromium resistor alloys. Represented by Charles S. Kinnison, W. D. Little, C. F. Busse and W. A. Gatward.

I

IMPERIAL DROP FORGE CO., Indianapolis—Showing manufactured automobile parts. Represented by George O. Desautels, E. E. Russell and E. B. Van Horn.

INDIANAPOLIS DROP FORGING CO., Indianapolis—Dies and drop forgings. Represented by Ferdinand Barnickol, president; John C. Beyer, superintendent; Ferdinand Barnickol, Jr., and L. M. Fehrenbach, purchasing agent.

INDIANAPOLIS LIGHT & HEAT CO., Indianapolis—Industrial electrical appliances.

K

KINNEY MFG. CO., Chicago—Small motor-driven positive pressure rotating plunger pump in operation. Represented by A. J. Munday.

L

LEEDS & NORTHROP CO., Philadelphia—Exhibiting potentiometer pyrometers of the indicating, recording, signaling and controlling types; also complete equipment for heat-treating steel according to the Hump method. Practically the entire exhibit will be in operation. Represented by Henry Brewer, Oscar Brewer, Jordan Korp, C. A. Martin, G. W. Tall, Jr., and A. E. Tarr.

M

MARSCHKE MFG. CO., Indianapolis—Electric-driven tool grinders and swagers, both bench and pedestal type.

MIDVALE STEEL & ORDNANCE CO., Philadelphia—The exhibit will feature what the company is able to accomplish with its tool steels at its own works. Represented by H. E. Rowe, in charge of the tool steel department, and George A. Richardson, in charge of advertising and exhibits.

O

OAKLEY CHEMICAL CO., New York. Exhibiting the powers of Oakite cleaning materials for removing quenching and tempering oils. Represented by Maxwell Lakeman and C. A. Ormsby.

Q

QUIGLEY FURNACE SPECIALTIES CO., New York—Featuring special material used in construction and maintenance of furnaces, boiler settings, kiln ovens, etc., including "Hytempite," high temperature cement, for bonding refractory materials; "Insulbrix," a cellular insulating refractory brick for conservation of heat, and "Carbosand," a highly refractory granular material for making rammed-in linings, special tile, patches and repairs in furnace structures, used with "Hytempite" as a bonding agent.

R

W. S. ROCKWELL CO., New York—Charts and other data to show the principles governing heat-treating operations and their application in modern practice. Represented by M. L. Hollister, Detroit, and H. J. N. Voltmann, New York.

P. H. & F. M. ROOTS CO., Connersville, Ind.—A horizontal low pressure blower, motor driven (to be used for furnishing air to one half the live exhibits); an Acme gas pump, arranged for constant speed motor drive and equipped with diaphragm operated by-pass, used for boosting the gas pressure to hardening furnaces and other industrial appliances; an Acme blower for tight and loose pulley drive; an Acme blower for single pulley drive; an Acme hand blower for portable forges and blacksmith fires; horizontal low pressure blower, pulley drive, with case and headplates cut away to show the rotating parts; also the original Roots blower, made in 1859. Represented by E. D. Johnston, president; C. C. Abbott, vice-president; J. B. Patterson, Chicago district manager, and Y. R. Schively, engineer.

S

SIMONDS MFG. CO., Fitchburg, Mass.—Exhibiting in a double booth, half of which will be devoted to showing the products of the Simonds steel mill, Lockport, N. Y., consisting of carbon and high-speed steel sheets and bars, high-speed steel bits and some of the products made from Simonds steel, half to be occupied by a demonstration of a Simonds inserted tooth metal cutting saw in operation on a cold cutting-off machine. Represented by H. B. McDonald, G. R. Bird, H. D. Weed and R. A. Shaffer.

SMITH GAS ENGINEERING CO., Dayton, Ohio—A few small American Gas Furnace Co.'s furnaces, operating on clean, cold producer gas and a Smith recording gas calorimeter. Represented by R. M. Chatterton, William P. Duff and Earl E. Adams.

SPENCER TURBINE CO., Hartford, Conn.—Turbo compressors for use in supplying air to oil burning furnaces. Represented by S. E. Phillips, secretary, and H. M. Grossman, sales engineer.

STROMBERG ELECTRIC CO., Chicago—Process timing and signalling instruments for controlling the time element and preventing the process from running too short or too long a time; Stromberg No. 35 job time recorders, printing exact time of start and completion of work on any job or operation; Stromberg in-and-out employees' recorders for payroll and time records; Stromberg electric time stamps for stamping exact time on all kinds of papers passing through various departments; Wm. P. Martin, Jr., in charge of booth.

SURFACE COMBUSTION CO., New York—A combination oven furnace for heat-treating high-speed steel, a Glory hole furnace operated at 3000 deg. Fahr., and impact and tunnel burners operated with the company's high pressure system. Represented by Messrs. Hollinger, Evans and Harris.

T

TAYLOR INSTRUMENT COMPANIES, Rochester, N. Y.—Pyrometric instruments for determining temperatures from 500 to 4500 deg. Fahr. Instruments will be in operation showing the method of application for determining temperatures, also for the control of temperatures. Represented by H. B. Brown and A. J. Wagner.

V

VANADIUM ALLOYS STEEL CO., Pittsburgh—High speed, carbon and alloy tool steel and ferrotungsten; also boards displaying various tools, such as milling cutters, threading cutters, dies, forgings, rolls, etc. Represented by J. P. Gill, metallurgist; William R. Mau, Chicago district manager; A. G. Henry, special representative; R. D. Guisewite, Indiana representative.

W

WESTINGHOUSE ELECTRIC & MFG. CO., Pittsburgh—Small furnaces for laboratories, instrument manufacturers, tool shops, etc., with temperatures up to 2000 deg. Fahr.; also, heavy duty industrial furnaces for any kind of heat treating process, any size, any capacity, temperatures up to 2000 deg. Fahr., including single end and double end furnaces. Furnaces in operation.

WILSON-MAEULEN CO., New York—Multiple type pyrometer recorder, the tapalog, its mono-pivot pyrometer indicators and three models of the Rockwell direct-reading hardness tester. Represented by Harry Goldsen, Western representative, and S. C. Horn, Pittsburgh representative.

WITHEROW STEEL CO., Pittsburgh—Samples of continuous die rolled products, together with micro studies and test data showing the comparison of physical properties of forged, upset and rolled pieces. Represented by W. C. Emory, metallurgist; H. H. Bridge, Bridge-Richards Co., Detroit; F. L. Carroll, Steel Sales Corporation, Chicago; F. G. Baldwin and J. P. Tarvin, Baldwin-Tarvin Co., Cincinnati, all sales representatives.

Three Types of Alloy Sheet Steel—II.

Details of Heat Treatment Necessary to Attain Highest Tensile Strength—Hardness and Other Data

BY HORACE C. KNERR*

THE bend specimens and one set of tensile specimens were tested as received, not heat treated. The other tensile specimens were heat treated at quenching temperatures recommended by the steel manufacturer. Two drawing temperatures were used on duplicate sets of specimens to note the effect of variations in drawing temperature. The higher temperature was aimed to give approximately 150,000 lb. per sq. in. ultimate strength.

The specimens were placed in an electric muffle furnace at approximately room temperature, heated gradually to the quenching temperature within about one hour and held for 15 or 20 min. They were then instantly quenched in oil (Houghton's No. 2 soluble), with vigorous agitation until cold. The specimens were reheated to the required drawing temperature in the same furnace, held 20 to 30 min., and allowed to cool in air. Water or oil cooling after drawing might have been preferable for the nickel-chromium steel, on account of its known tendency to temper-brittleness, but it was considered that the specimens were thin enough to insure a sufficiently rapid cooling in air. The temperatures of heat treatment were as follows:

Steel	Quenched in Oil, Deg. at	Drawn, Deg. Lot No. 1	Drawn, Deg. Lot No. 2
Chromium-vanadium steel.	1,650 F. (900 C.)	800 F. (425 C.)	950 F. (510 C.)
Nickel-chromium steel.....	1,500 F. (815 C.)	800 F. (425 C.)	900 F. (480 C.)
Nickel steel, 3.50 per cent.	1,500 F. (815 C.)	700 F. (370 C.)	800 F. (425 C.)

The limited amount of material available prevented further experimentation with heat treatment. Brinell and Shore hardness readings were taken after quenching and drawing. The weld specimens, both acetylene and electric spot, were given the same heat treatment as the 150,000 lb. per sq. in. tensile specimens.

The drawing temperature for Lot No. 2 was shown to be about correct to give 150,000 lb. per sq. in., except for the chromium-vanadium steel, which might have been better drawn at about 1000 deg. Fahr. or upward.

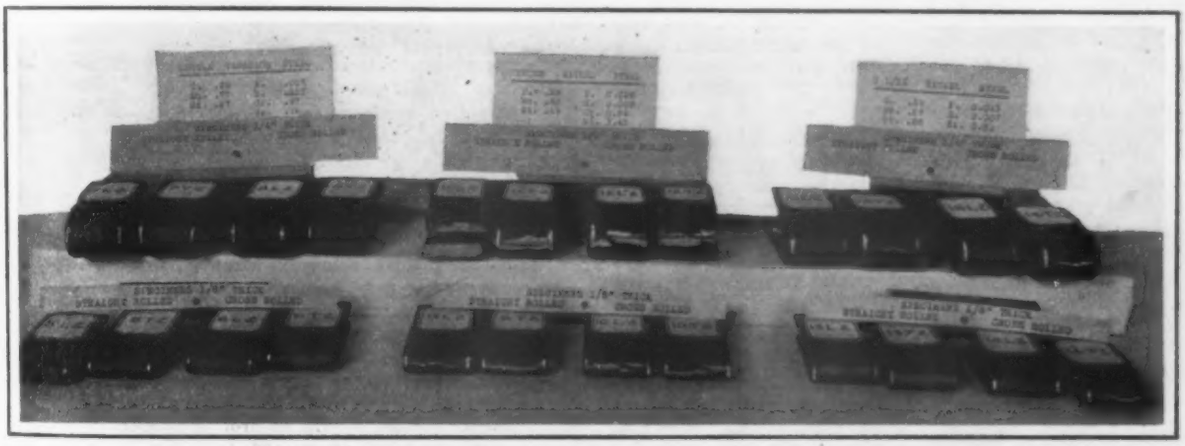
Note—In heat-treating chromium-vanadium steel fittings of slightly higher carbon content (0.30 to 0.40 per cent), satisfactory results have been obtained in production during the past year by regulating the drawing temperature according to Brinell hardness after quenching, which varies with thickness of piece and with tolerance variations in chemical composition, as follows:

Quench in oil at 1600 to 1625 deg. Fahr.
Brinell hardness after quenching, 375 to 420, 425 to 470, 475 to 525.
Drawing temperature, 1050, 1100, 1150 deg. Fahr.
Brinell hardness required after drawing, 275 to 350.

Variations in quenching temperature of plus or minus 25 deg. Fahr. do not greatly affect the tensile strength, ductility or hardness of chrome-vanadium steel. This was shown in a test on samples of steel of similar composition (No. 6135) quenched at varying temperatures, the results of which are given in one of the illustrations.

Bend Tests and Results

The bend specimens were tested in the condition as received from the manufacturer, or box annealed.



Bend Specimens of the Various Alloy Sheet Steels for Aircraft Parts. They were annealed and were 1 in. wide and bent over a diameter equal to their thickness

A V-block with rounded edges was used to start the bend under the compression head of a testing machine, and, after bending to about 90 deg., the specimen was flattened over a sheet of its own thickness in the machine.

The results of bend tests were very positive and are clearly shown in one of the illustrations. Two longitudinal and two transverse specimens from each sample sheet were tested. One complete set (specimen No. 2, of each pair) is shown. The results were as follows:

Bend Test—Material Box Annealed

Chromium-vanadium .....All satisfactory
Nickel-chromium .....All failed badly
Nickel steel, 3.50 per cent.
Unsatisfactory, only a few specimens passed

The 3.50 per cent nickel steel specimens, marked L, withstood bending slightly better than those marked T, otherwise there was no noticeable difference in any type of steel, between either longitudinal and transverse specimens, straight and cross rolled specimens or ⅛ and ¼ in. specimens.

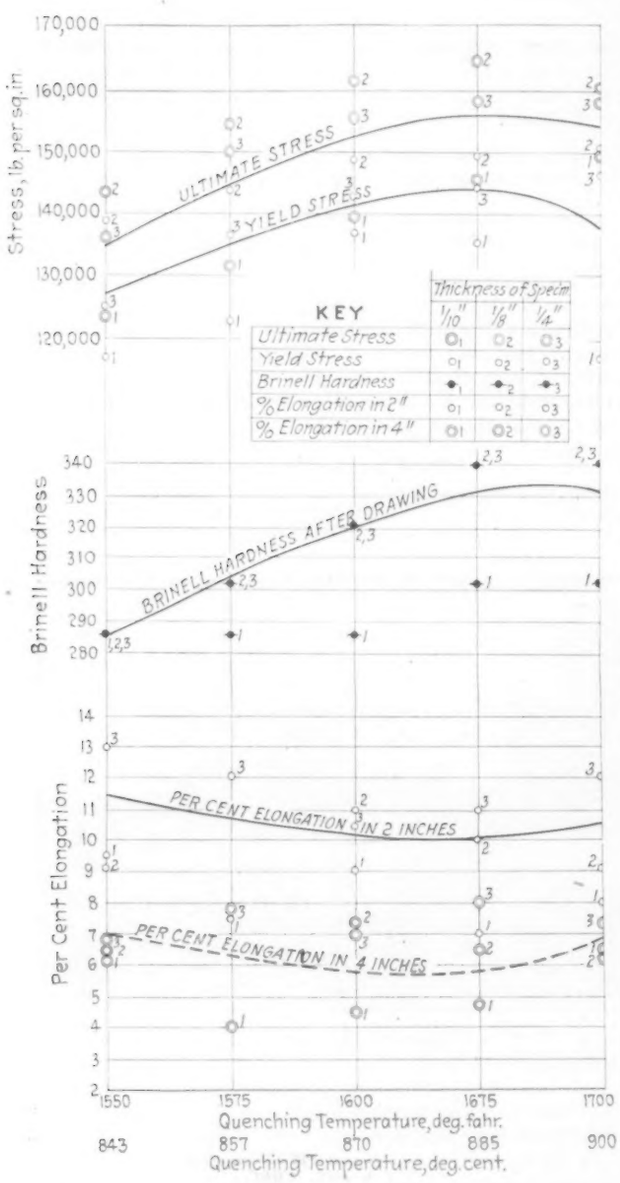
That the distinctly superior quality of the chromium-vanadium specimens in the cold bend test is due mainly to the alloy, rather than to questions of manufac-

*Metallurgist Naval Aircraft Factory, Philadelphia. The first installment appeared in THE IRON AGE Sept. 8.

ture, rolling, annealing, etc., appears probable for the following reasons:

The carbon content of the three steels is alike and the content of other elements common to two or more of them is similar.

The samples were manufactured in the same mill by the same process and presumably with the same degree of skill and care.



Effect of Variation of Quenching Temperature on Physical Properties of the Three Alloy Sheet Steels. Specimens drawn at 1100 deg. Fahr. or 593 deg. C.

All the sheets were box annealed together. (It may be that an annealing treatment best for one alloy would not be best for another.)

Considerable quantities of chromium-vanadium steel and of 3.50 per cent nickel steel of analyses similar to the corresponding samples in this investigation, but furnished by a different manufacturer, showed similar characteristics in bending. The chromium-vanadium steel was entirely satisfactory, whereas the 3.50 per cent nickel steel failed in spite of systematic efforts to improve its quality by special annealing or heat treatment. (It is also worthy of note that a quantity of carbon-vanadium sheet steel, received from a third manufacturer, at an earlier date, failed badly in the bend test. The specified analysis of the latter steel was: Carbon, 0.35 to 0.45 per cent; manganese, 0.70 to 1.00 per cent; sulphur, 0.05 per cent max.; phosphorus, 0.045 per cent max.; and vanadium, 0.15 per cent min. Vanadium is in itself, therefore, not an assurance of satisfactory cold bending qualities.)

Possible causes of the tendency to split longitudinally in bending have been discussed in another report, No. 2M20-3.

Tensile Tests: Material, Box Annealed

A tensile specimen, direction L, from each sample was tested in the condition as received from the manufacturer, or, box annealed, corresponding to the condition in which the bend specimens were tested and in which the material is worked in fabrication. Test results are given in Table No. 1. (Specimens in direction T were not made on account of lack of material, but tests on the heat treated specimens showed little difference with direction of grain. Longitudinal and transverse tensile tests on similar material from another source in the annealed condition differed little, even when there was a pronounced tendency to split longitudinally in bending.) The following points are of interest:

The annealed chromium-vanadium steel showed the greatest average elongation and the lowest tensile strength and hardness. (The other steels, especially nickel-chromium, might have been made softer by different annealing treatment but lack of time and material prevented further experiments in this direction.)

The low ratio of yield strength to ultimate strength of all types is notable, compared with their high ratio when heat treated.

The yield point and elongation are about the same for all three alloys as would be expected from corresponding annealed carbon steel, but the ultimate strength is higher.

There was more variation in the tensile strength of the annealed specimens than was indicated by Brinell hardness readings.

Tensile Tests, Heat-Treated

The results of tensile tests on heat-treated specimens are given in the tables, with a tabulation of the qualitative differences between cross rolled and straight rolled specimens in Table No. 5. It should be borne in mind that each test represents only one specimen of a given type, thickness, condition and treatment. However, in such small samples, little if any variation between specimens is likely and Brinell hardness readings, especially after heat treatment, showed marked uniformity.

Table No. 1—Tensile Tests of Materials

STEEL, BOX ANNEALED, AS RECEIVED FROM MANUFACTURER—BEND TESTS MADE AND FABRICATION DONE IN THIS CONDITION

Chromium-Vanadium Steel (No. 6135)

Thickness	⅛ In.		¼ In.		Average
Rolled	Straight	Cross	Straight	Cross	
Mark	5L	6L	7L	8L	
Brinell No.	156	163	163	156	160
Shore No.	30	36	38	41	36
Yield lb. per sq. in.	54,000	49,000	42,500	46,800	48,000
Tensile lb. per sq. in.	75,000	100,000	76,400	73,400	81,200
Elong. in 2 in., per cent	27.5	22.5	27.5	32.5	27.5
Red. of area, per cent.	55.0	50.0	52.0	57.0	53.0

Nickel-Chromium Steel (See Analysis)

Thickness	⅛ In.		¼ In.		Average
Rolled	Straight	Cross	Straight	Cross	
Mark	9L	10L	11L	12L	
Brinell No.	199	187	207	192	196
Shore No.	27	24	28	28	27
Yield lb. per sq. in.	53,300	44,200	42,800	40,100	45,100
Tensile lb. per sq. in.	75,100	91,400	96,500	93,200	89,000
Elong. in 2 in., per cent	21.5	23.5	21.0	25.0	23.0
Red. of area, per cent.	51.0	45.0	42.0	39.0	44.0

Nickel Steel, 3.50 Per Cent (No. 2330)

Thickness	⅛ In.		¼ In.		Average
Rolled	Straight	Cross	Straight	Cross	
Mark	13L	14L	15L	16L	
Brinell No.	163	179	170	179	173
Shore No.	35	37	26	27	31
Yield lb. per sq. in.	45,300	47,600	46,500	39,100	44,600
Tensile lb. per. sq. in.	82,400	87,900	107,800	133,300	102,800
Elong. in 2 in., per cent	23.5	26.5	30.0	25.0	26.0
Red. of area, per cent.	46.0	45.0	53.0	51.0	48.0

NOTE.—Shore hardness readings of questionable accuracy. Yield points taken by drop of beam. Brinell hardness readings, 10 mm. ball, 3000 kg. load in these and all following tests.

Analysis of the data reveals a number of significant points, among which are the following:

The tensile properties of the three types of alloy steel are much alike after appropriate (but different) heat treatment; that is, by quenching each steel at its proper temperature and drawing back to give the de-

Table No. 2—Summary of Tensile Tests—Lot No. 1 (Low Drawing Temperature)
(a) Chromium-Vanadium—Quenched 1650 Deg. Fahr.—Drawn 800 Deg. Fahr.

Thick. Spec.	After Q Hb	After Q Hs	After D Hb	After D Hs	Ult. Str.	Yld. Str.	Elong. % in 2 In.	Elong. % in 4 In.	Red. of Area, %
⅛ in. 5 and 6 L1	444	66	357	60	184,750	166,600	5.0	3.1	18.4
⅛ in. 5 and 6 T1	431	63	345	39	178,600	161,500	5.7	3.7	33.4
Aver. ⅛ in.	437	64	351	59	181,670	164,050	5.3	3.4	25.9
¼ in. 7 and 8 L1	418	61	364	56	187,600	164,800	8.0	5.0	40.5
¼ in. 7 and 8 T1	431	64	364	58	185,300	160,800	8.0	4.6	36.0
Aver. ¼ in.	424	62	364	57	186,450	162,700	8.0	4.8	38.2
Grand aver.	430	63	357	58	184,060	163,370	6.6	4.1	32.0
(b) Nickel-Chromium—Quenched 1500 Deg. Fahr.—Drawn 800 Deg. Fahr.									
⅛ in. 9 and 10 L1	431	64	340	58	167,600	141,900	7.7	4.1	44.7
⅛ in. 9 and 10 T1	418	61	330	57	170,000	142,500	6.2	3.6	37.5
Aver. ⅛ in.	424	62	335	57	168,800	142,200	6.9	3.8	41.1
¼ in. 11 and 12 L1	431	63	357	58	175,700	159,400	8.5	5.3	40.0
¼ in. 11 and 12 T1	431	61	357	58	171,800	153,600	10.2	5.8	48.0
Aver. ¼ in.	431	62	357	58	173,750	156,500	9.3	5.5	44.0
Grand aver.	427	62	356	57	171,270	149,300	8.1	4.6	42.5
(c) Nickel, 3.50 Per Cent—Quenched 1500 Deg. Fahr.—Drawn 700 Deg. Fahr.									
⅛ in 13 and 14 L1	437	57	311	53	178,300	150,300	7.0	4.0	49.5
⅛ in. 13 and 14 T1	418	57	325	55	179,700	151,200	6.7	4.2	49.2
Aver. ⅛ in.	427	57	318	54	179,000	150,750	6.8	4.1	49.3
¼ in. 15 and 16 L1	416	57	330	51	178,000	156,200	9.0	4.7	47.0
¼ in. 15 and 16 T1	418	58	349	55	187,300	163,000	8.0	4.9	44.0
Aver. ¼ in.	417	57	335	53	182,650	159,600	8.5	4.8	45.0
Grand aver.	422	57	326	53	180,820	155,170	7.6	4.4	47.1

N°95.—Values given are average of straight and cross rolled specimens. This table, and Table No. 3, permit comparison between L and T specimens of each type of alloy, and also comparison between ⅛ and ¼ in. specimens.

sired tensile strength. There is no marked advantage of one type over another in respect to the combination of tensile strength and elongation (Table No. 4).

There is a pronounced difference in tensile strength and elongation between the ¼-in. and ⅛-in. thick specimens of each type of steel. The ¼-in. specimens of all types exceed the specified requirements, whereas the ⅛-in. specimens fall slightly below, either in tensile strength or ductility, or both. (Table No. 3.)

The yield stress of all the steels is closer to the ultimate than required in the specifications and exceeds the given minimum (125,000 lb. per sq. in.) even in the ⅛-in. thickness. (Table No. 3.)

Average values of all the steels considerably exceed the revised minimum elongation of 8 per cent in 2 in. at 150,000 lb. per sq. in. ultimate (Table No. 4).

Any of these steels would meet the following physical requirements at a low drawing temperature, although this is not recommended:

Ultimate tensile strength.....175 000 lb per sq. in.
Yield strength .....150,000 lb. per sq. in.
Elongation in 2 in. (¼ in. thick).....8 per cent

For sheets under ¼-in. thick, the elongation or gage length to be some function of the thickness.

The tensile properties and Brinell hardness for a given thickness and drawing temperature are remarkably uniform in each type.

Cross rolling slightly improves the tensile strength and elongation of all the steels, taking the average of longitudinal and transverse specimens (Table No. 5).

(*Note.*—As stated specimens marked longitudinal (L) and transverse (T) may have been reversed in some instances, owing to the absence of means for determining positively which were the true directions in the samples).

The cross rolled samples show, in general, slightly less variation between L and T specimens than shown in the straight rolled samples. This was to be expected, but the difference hardly warrants extra expense in manufacture.

The variation of tensile strength and elongation between L and T specimens in the straight rolled samples is greater than for cross rolled, but is slight for all the steels and follows no definite rule. (In four cases out of 12 the specimens having highest tensile strength also show greatest elongation in 2 in.; in five cases the reverse is true, and in three cases the tensile strength or elongation is practically the same, with the other factor showing a very slight difference.)

The lower percentage elongation of thin specimens in a given gaged length may obviously be explained

Table No. 3—Summary of Tensile Tests—Lot No. 2

DRAWING TEMPERATURE, AIMED TO GIVE 150,000 LB. PER SQ. IN. ULTIMATE STRENGTH
(a) Chromium-Vanadium—Quenched 1650 Deg. Fahr.—Drawn 950 Deg. Fahr.

Thick. Spec.	After Q Hb	After Q Hs	After D Hb	After D Hs	Ult. Str.	Yld. Str.	Elong. % in 2 In.	Elong. % in 4 In.	Red. of Area, %
⅛ in. 5 and 6 L2	431	63	269	51	157,500	143,500	7.7	4.7	37.6
⅛ in. 5 and 6 T2	431	62	273	47	153,500	140,000	8.0	5.2	43.2
Aver. ⅛ in.	431	62	271	49	155,500	141,750	7.8	4.9	40.4
¼ in. 7 and 8 L2	431	63	316	46	164,200	148,500	9.7	5.7	41.5
¼ in. 7 and 8 T2	437	64	336	49	165,000	145,400	10.2	6.0	36.0
Aver. ¼ in.	434	63	326	47	164,600	146,900	9.9	5.8	38.7
Grand aver.	432	62	298	48	160,050	144,320	8.8	5.3	39.5
(b) Nickel-Chromium—Quenched 1500 Deg. Fahr.—Drawn 900 Deg. Fahr.									
⅛ in. 9 and 10 L2	418	63	294	47	147,700	135,300	9.0	5.5	45.1
⅛ in. 9 and 10 T2	416	63	302	49	147,700	134,500	8.5	4.7	39.4
Aver. ⅛ in.	417	63	298	48	147,700	134,900	8.7	5.1	42.2
¼ in. 11 and 12 L2	439	64	330	51	157,600	146,000	10.0	5.6	43.5
¼ in. 11 and 12 T2	431	63	336	49	158 600	141 600	11.7	6.5	47.0
Aver. ¼ in.	435	63	333	50	158.100	143,700	10.8	6.0	45.2
Grand aver.	426	63	315	49	152,900	139,300	9.7	5.5	43.7
(c) Nickel, 3.50 Per Cent—Quenched 1500 Deg. Fahr.—Drawn 800 Deg. Fahr.									
⅛ in. 13 and 14 L2	418	56	293	47	144,600	129,700	9.0	5.1	51.2
⅛ in. 13 and 14 T2	423	58	289	46	146,500	133,500	9.5	5.0	45.8
Aver. ⅛ in.	420	57	291	46	145,550	131,600	9.2	5.0	48.5
¼ in. 15 and 16 L2	418	57	307	46	152,600	138,000	10.7	6.6	50.7
¼ in. 15 and 16 T2	418	56	303	45	153,500	141,400	10.0	5.5	45.1
Aver. ¼ in.	418	56	305	45	153.050	139,700	10.3	6.0	47.9
Grand aver.	419	56	298	45	149,300	135,650	9.7	5.5	48.2

NOTE.—Same as Table No. 2, showing values with drawing temperature aimed to give 150,000 lb. per sq. in. ultimate stress.

by their smaller necking down. Strictly, the gaged length should be a function of the dimensions of the cross section in determining ductility by percentage elongation, or the required elongation should be a function of the thickness or area.

The lower unit tensile strength of the thinner specimens of corresponding analysis and heat treatment was probably caused by surface decarburization done in heating, rolling and annealing, which for a given depth would have a greater proportional effect on thin specimens than on thick.

Another possible explanation is that the thick specimens were not drawn as effectually as the corresponding thin specimens under the same heat treatment. This supposition is strengthened by the fact that the average Brinell hardness readings were, in general, about alike for ⅛ and ¼ in. specimens after quenching, whereas after drawing the thin specimens were all decidedly the softer. The temperature and time of drawing were identical, the specimens being treated together, but the thin specimens were doubtless penetrated more quickly by the heat. A longer time of drawing should equalize this condition, if it exists.

Hardness Tests

Hardness tests were made on all specimens, as received, after quenching and after drawing. Results are given in the tables with tensile tests. The following points are noteworthy:

As received, in the box annealed condition, the chromium-vanadium steel was softest and nickel-chromium the hardest in Brinell test. (Table No. 1.) This hardness gradation corresponds with the order of brittleness of the three types of steel under the bend test, but it is believed insufficient alone to account for the great difference in bending qualities of the steels.

Very roughly, the Brinell hardness number multiplied by 500, equals the ultimate tensile strength

Table No. 4—Final Summary of Tensile Tests
Averages, ⅛ and ¼ in. Specimens
Lot No. 1—Low Drawing Temperature (From Table No. 2)

Steel	Chromium-Vanadium	Nickel-Chromium	Nickel, 3.50 Per Cent
Oil quenched, deg. Fahr.	1,650	1,500	1,500
Brinell hardness, quenched	430	427	422
Shore hardness, quenched	63	62	57
Drawn at deg. Fahr.	800	800	700
Brinell hardness, drawn	357	356	326
Shore hardness, drawn	58	57	53
Ultimate stress, lb. per sq. in.	184,060	171,270	180,820
Yield stress, lb. per sq. in.	163,370	149,300	155,170
Elong. 2 in., per cent	6.6	8.1	7.6
Elong. 4 in., per cent	4.1	4.6	4.4
Red. of area, per cent	32.0	42.5	47.1
Lot No. 2—Medium Drawing Temperature			
(Aimed to Give 150,000 Lb. Per Sq. In. Ultimate Strength)			
(From Table No. 3)			
Oil quenched from, deg. Fahr.	1,650	1,500	1,500
Brinell hardness, quenched	432	426	419
Shore hardness, quenched	62	63	56
Drawn at deg. Fahr.	950	900	800
Brinell hardness, drawn	298	315	298
Shore hardness, drawn	48	49	45
Ultimate stress, lb. per sq. in.	160,050	152,900	149,300
Yield stress, lb. per sq. in.	144,320	139,300	135,650
Elong. 2 in., per cent	8.8	9.7	9.7
Elong. 4 in., per cent	5.3	5.5	5.5
Red. of area, per cent	39.5	43.7	48.2

REMARKS.—It is noteworthy that Brinell and Shore hardness after quenching, of Lots 1 and 2, agree very closely, showing uniformity of material.

of the annealed specimens, but there are some pronounced exceptions to this rule in all three types.

The Shore hardness readings are given for what they are worth, but they do not appear to bear a constant relation either to the Brinell hardness, the yield strength or the ultimate strength of the annealed steels.

The Brinell and Shore hardness of all specimens is of the same order after quenching, independent of the alloy and thickness. (Tables Nos. 1a, 1b, 1c.)

The Brinell hardness after drawing, multiplied by 500, gives a fairly close approximation of the ultimate tensile strength, for all the steels at both drawing temperatures, and independent of thickness. The error is, in general, less than 10 per cent, and lies on the safe side for the chromium-vanadium and 3.50 per cent nickel steel (Tables Nos. 1a and 1c), but the estimated value is above the true value for the nickel-chromium steel.

The Brinell hardness after drawing was, in general, lower for the ⅛-in. than for the ¼-in. specimens (Tables Nos. 2 and 3). This corresponds with the lower tensile strength of the ⅛-in. specimens, but is contrary

Table No. 5—Straight vs. Cross Rolling
Qualitative Comparison, Ultimate Stress (S) and Elong. in 2 In. (E)

Drawn Deg. Fahr.	Thickness In.	
Chromium-Vanadium Steel		
800	⅛	Cross slightly greater S and greater E
	¼	Cross slightly greater S and greater E
950	⅛	Cross slightly less S and greater E
	¼	Cross slightly less S and same E
	(5 greater, 2 less, 1 same)	
Nickel-Chromium Steel		
800	⅛	Cross slightly greater S and greater E
	¼	Cross slightly less S and less E
900	⅛	Cross slightly greater S and less E
	¼	Cross slightly greater S and greater E
	(5 greater, 3 less)	
Nickel Steel, 3.50 Per Cent		
700	⅛	Cross slightly greater S and greater E
	¼	Cross slightly greater S and same E
800	⅛	Cross slightly less S and greater E
	¼	Cross slightly greater S and same E
	(5 greater, 1 less, 2 same)	

NOTE.—All types show a slight advantage in cross rolled specimens, that is, they tend to have a higher average ultimate stress and elongation than the straight rolled specimens. The differences are very moderate, however.

to what would be expected from their more rapid cooling in quenching.

The Brinell test is obviously of great value in the inspection of parts after heat treatment. (A load of 3000 kg. with a 10 mm. ball was used throughout, and found satisfactory for the ⅛- as well as the ¼-in. thickness, but for lighter gages a lighter weight and possibly a smaller ball would be necessary, to avoid penetrating the sheet.)

Shore scleroscope readings on the heat-treated specimens show considerable uniformity for each type of steel and may possibly be used as a check upon the heat treatment of parts. Brinell readings are believed to be more reliable when they can be satisfactorily made.

(To be concluded)

Land to Be Acquired, Despite Objections of Illinois Steel Co.

MILWAUKEE, WIS., Sept. 12.—Forty-three acres of land on the south end of Jones island, belonging to the Illinois Steel Co., and partly occupied at present as docks and storage of the Bay View blast furnaces and rolling mills, will be acquired by the city of Milwaukee under condemnation proceedings. The decision was made after a series of hearings conducted by a jury empaneled to determine the necessity for condemnation of the property as a part of the site of proposed municipal lake and rail terminals and docks to insure the completion of the outer harbor project, which is being hastened to execution with the prospect of the consummation of the Great Lakes-St. Lawrence River deep waterway. The Government will expend $4,000,000 in completing the outer breakwater, according to assurances given the jury by Col. W. V. Judson, United States division engineer.

The Illinois Steel Co. opposed the condemnation of its property and at the final hearing held Aug. 31, E. J. Buffington, president of the company, presented a formal statement which read in part as follows:

Absolutely no extension or addition to the plant could be made on account of the lack of room therefor.

On account of the limited space for the storage of raw material, present operations would be curtailed from 50 to 75 per cent.

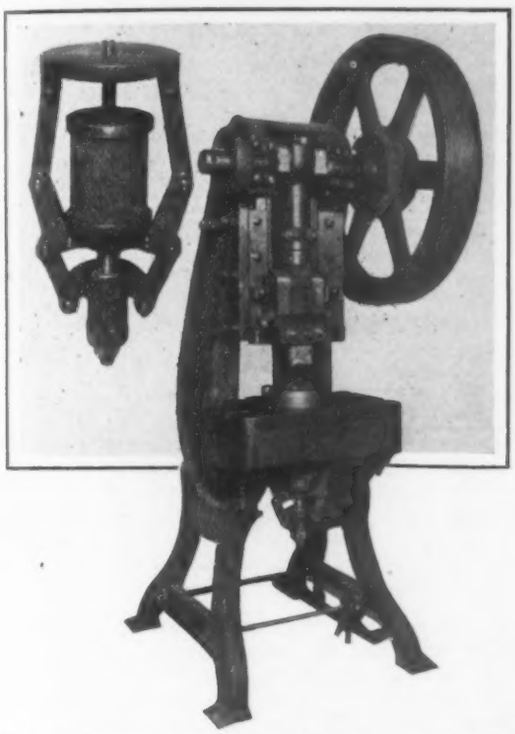
Blast furnaces could no longer be maintained for the reason that there would be no storage room. . . . Little likelihood that this company would wish to spend any money repairing, replacing or remodeling the present layout under such circumstances.

This company would eventually be compelled to abandon the plant on account of the inability to operate the same at its present capacity and on account of the inability to extend the same.

New Attachment for Combination Dies

The E. W. Bliss Co., Brooklyn, N. Y., is bringing out the combination toggle joint spring pressure attachment shown in the accompanying illustration. It is said to possess marked advantages for users of combination dies, particularly where lithographed metal is handled.

The attachment is designed to effect uniform drawing pressure on the blank during the entire draw, producing a more uniform edge and increasing the efficiency of the process by minimizing strain on the metal, reducing wrinkles, breakage and wear on the dies. The application of the toggle motion, in addition to giving a uniform pressure, reduces the total rubber or



The Application of the Toggle Motion Gives Uniform Pressure and Reduces Rubber or Spring Compression

spring compression materially. Strain on the press is reduced and saving in power effected by the elimination of accumulative spring pressure. The reduced compression adds considerably to the life of the rubber or spring, and is said also to permit of economical manufacture with combination dies of shells deeper than heretofore practical. Where reducing operations follow the first cutting and drawing the number of operations can be reduced and certain work that formerly required double action dies can be done in combination and reducing dies. A further advantage offered is that the reduced spring or rubber compression results in proportionate reduction of "back lash" of the press on the up stroke.

The attachment is regularly built in four sizes for standard Bliss presses and to install, no change in the press equipment is necessary. The dies can be removed as with the old style attachment. The depth of draw obtainable on presses No. 18, 19, 20 and 21 is 1¼, 1½, 2 and 2½ in., respectively. To obtain the maximum draws, given presses must have the same stroke and die space as necessary with the old style attachment. While a shell of greater depth may be drawn than with the old style, it is to be understood that to get the maximum depth of draw, correct working proportions between diameter and depth of shell must be maintained.

The Hendee Mfg. Co., Springfield, Mass., motorcycles, has reduced prices on its product 22½ per cent. Two new models have been added to the company's line.

Heavier Freight Movement at Pittsburgh

PITTSBURGH, Sept. 12.—A revival in business that is slow but still perceptible is noted in freight traffic figures for the Pennsylvania, the Baltimore & Ohio and the Pittsburgh & Lake Erie railroads. While purchases of goods and materials are held back in many instances on account of the adjustment of wages and costs, confidence is again an element in the business world.

The Pennsylvania Railroad reports that daily average loaded cars dispatched in the Central Region in August numbered 23,423, an increase of 509 over July, the daily average. The banner day was Aug. 27, when 27,527 were dispatched. For the same month last year, an average of only 16,000 cars was moved daily. Coke shipments from the Connellsville region reflected the low rate of production of blast furnaces and foundries. Shipments for August showed an average of only 400 cars, or 16,000 tons daily, as compared with about 800 cars a day one year ago.

The Pittsburgh & Lake Erie Railroad reports a 10 per cent improvement in the movement of freight in August as compared with July. Shipments of steel, coke, builders' supplies and cement over the company's line from Pittsburgh to Youngstown all showed increases.

The Baltimore & Ohio Railroad reports improvement in shipments of iron, steel, road building materials and coal. Increases in shipments have been recorded in Pittsburgh, Cleveland and Youngstown. Coke shipments on this road are reported to be 10 per cent lower than for the same period a year ago.

New Quick Change Gear Lathes

The South Bend Lathe Works, South Bend, Ind., has added to its line of engine lathes a quick change gear pattern which will be furnished in sizes from 9 to 24 in., swing, inclusive. The plain change gear lathes will be made in the same sizes, as heretofore.

The quick change gear box used is the same as that on the Flather lathe, the company having secured the

Forty-eight Changes Are Obtainable for Both Feeds and Threads

shop rights covering that design. Forty-eight changes are obtainable both for feeds and threads, these changes applying also to the cross feed. All gears in the box are made from steel forgings. As shown in the accompanying illustration the index plate on the box is arranged to receive the plunger for the different changes, the crank lever above being used to operate the clutch of the inside which controls 1 for 2 and 2 for 1 gears. The lever is thrown up from the bottom. Opposite each hole on the bottom there is a notch and as the lever is brought up to make a change an extension on the inner side of the lever drops into the notch, no adjustment being necessary.

The regular equipment includes large and small face plates, graduated compound rest, follower rest (not on the 9 and 11-in. lathes) adjustable stop for screw cutting, semi-machined chuck back, gear guards, wrenches and countershaft.

The City of Youngstown, Ohio, has awarded a contract to the National Cast Iron Pipe Co. to supply pipe 20-in. or under for the first unit of a proposed belt line to be constructed around the city by the water works department. The company bid $38.10 per ton.

Screw Stock Heat Treated With Oil

Application of the Mircs System to Ferrous and Non-Ferrous Material by the Bridgeport Screw Co.—Operating Data

AN application of oil-burning equipment for annealing, heat treating and drying screw stock on a large scale was recently made by the Bridgeport Screw Co., Bridgeport, Conn. The type installed is of the Mircs design for which F. J. Ryan & Co., Philadelphia, are both the contractors and engineers, having recently taken control of the Mircs Fuel Oil Equipment Co. The installation is claimed to be typical of the flexibility of oil burning in heating problems and as an example of its economy. A description of the installation, furnished by F. J. Ryan, president of the company, follows:

The installation covers five pot muffle annealers, one small gage wire annealer used for both ferrous and non-ferrous products and two drying ovens. The Mircs No. 2 universal burner was used throughout the installation with air pressures of approximately 14 oz. The burner mechanically atomizes the oil and is adjustable for use of low or high gravity oils at either low or high pressures. Rearrangement for either operation can be made without the removal of the burner which allows for adjustment to oil market conditions. In the present operations described, Mexican oil of the standard grades now obtainable is used at a pressure of approximately 10 lb.

The manufacturing process surrounding the heat-treating departments is one of exacting demands and the question of uniform, regulated annealing and drying has a direct connection with the ultimate resulting product. The procedure in this department is, first, thorough annealing at temperatures ranging from 1400 to 2000 deg. Fahr. in accordance with the requirements of the charge; second, pickling by a special method developed by the engineers of the Bridgeport Screw Co., and third, a thorough and regulated drying at a temperature of approximately 475 deg. Fahr. The last operation is of keen interest because it is the correctness of this operation that decides to a large degree the quality of the finished product.

After annealing, when the wire is treated in the pickling vats, it must be dried over a proper period and at a proper temperature to eliminate and kill the action of acids that may remain after washing. Unless this remaining acid is thoroughly removed by this drying process, it gradually eats into the steel and the majority of screw head defects can be attributed directly to it. This drying must take place in an atmosphere entirely free of gases. It was therefore necessary to so design the ovens as to secure the heat without exposing the material to the direct action of the gases developed in the burning of the oil.

This was accomplished by building a system of refractory channels emanating from the main combustion chamber, the top of which was covered with interlocking curved cast iron cover plates, the interlocking edges having channel sections for luting. The heat therefore developed in the combustion chamber travels through these flues, heating up the cover plates, and the resulting temperatures in the oven are secured by the radiation from these plates.

It was found that by running two burners on each oven at approximately 800 to 1000 deg. Fahr., a resulting temperature of 450 to 475 deg. Fahr. was obtainable in the baking chamber. It was also found that this could be increased or decreased by adjusting the quantity of the oil being burned.

The pot annealers through which the wire first passes are so constructed that the entire combustion takes place in two combustion chambers at the bottom of each pot directly opposite to each other. The heat developed passes through flues into the annealing chamber by ports distributed in such a way as to give even distribution. Cast iron pots are used as retainers for the wire during annealing, having sealed covers to eliminate any possibility of action from the surrounding gases.

The main casing of the furnace is of riveted steel plate with a structural ring holding refractories constituting the cover. Exhaust gases pass through ports in this cover directly into the room and are exhausted through vents in the roof. No detrimental results have been experienced from these exhaust gases. The following is a brief summary of some of the many heats that have been run on this equipment:

Pot Furnaces

Fur No.	Starting Furnace, p.m.	Temp., Deg. Fahr.	Heat Ended, a.m.	Temp., Deg. Fahr.	Fuel Used	Charge in Lb.	Gals. Per Hr.	Gals. Per B.
1	11:00	1,602	8:00	1,681	77	10,667	8.66	4.33
2	11:00	2,048	8:00	2,113	65	10,667	7.00	3.50
3	11:00	1,589	8:00	1,663	74	10,667	8.00	4.00
4	11:00	1,700	6:00	1,800	100	10,667	14.28	7.14
5	11:00	1,333	6:00	1,427	94	10,667	13.28	6.71
1	6:00	1,682	3:00	1,773	91	10,667	11.11	5.55
2	6:00	2,115	3:00	2,204	89	10,667	9.88	4.99
3	6:00	1,666	3:00	1,750	84	10,667	9.32	4.66
4	5:00	1,801	3:00	1,902	101	10,667	12.62	6.31
5	5:00	1,428	3:00	1,507	79	10,667	9.87	4.93

It will be noted that the time of annealing runs between seven and nine hours and that the charge per pot averages slightly more than five tons.

The average oil consumption is in the neighborhood of 90 gal. per furnace or practically 20 gal. for each ton of material brought to temperature and carried through the proper time range. Taking oil at the present average market quotation of 5c. per gal., the cost of fuel is roughly $1 per ton. However, in this instance, nearly 40 per cent of the total weight is invested in the pot and the coil support which can not be considered. Therefore it can be conservatively estimated that $1.60 is the present fuel oil cost in this annealing process. The temperature in the furnaces at the start and finish varied very little which is an indication of the controlability of fuel oil where temperature control is of interest.

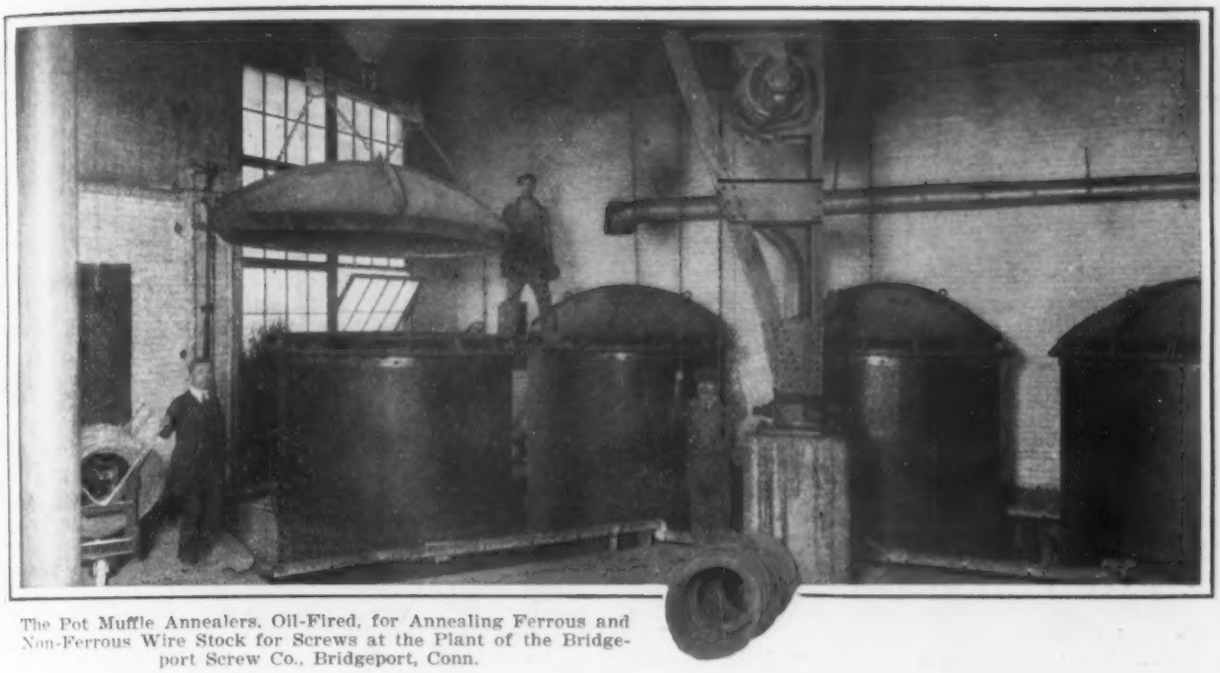
The small annealing furnace takes care of annealing of the special light gage wire products, some of which are of the thinness of thread and demand the most exacting attention through this process. The material is coiled in small light gage steel containers which have tight fitting covers. The quantity of the charge varies greatly in accordance with the size of the wire. The furnace has a rated capacity of one ton. The following is a brief extract of a six days' run on this furnace:

Small Annealing Furnace

Starting Furnace a.m.	Temp., Deg. Fahr.	Heat Ended p.m.	Temp., Deg. Fahr.	Fuel Used
7:00	77	6:00	128	51
7:00	128	6:00	171	43
7:00	171	6:00	199	28
7:00	199	6:00	254	55
7:00	254	6:00	298	44
7:00	298	6:00		

It will be noted that the temperature range on this equipment was also well under control.

The following are the results obtained on two runs in the No. 1 bake oven. Both of these ovens are of the same general design and it can therefore be con-



The Pot Muffle Annealers, Oil-Fired, for Annealing Ferrous and Non-Ferrous Wire Stock for Screws at the Plant of the Bridgeport Screw Co., Bridgeport, Conn.

sidered that the results will be approximately the same.

Run No. 1

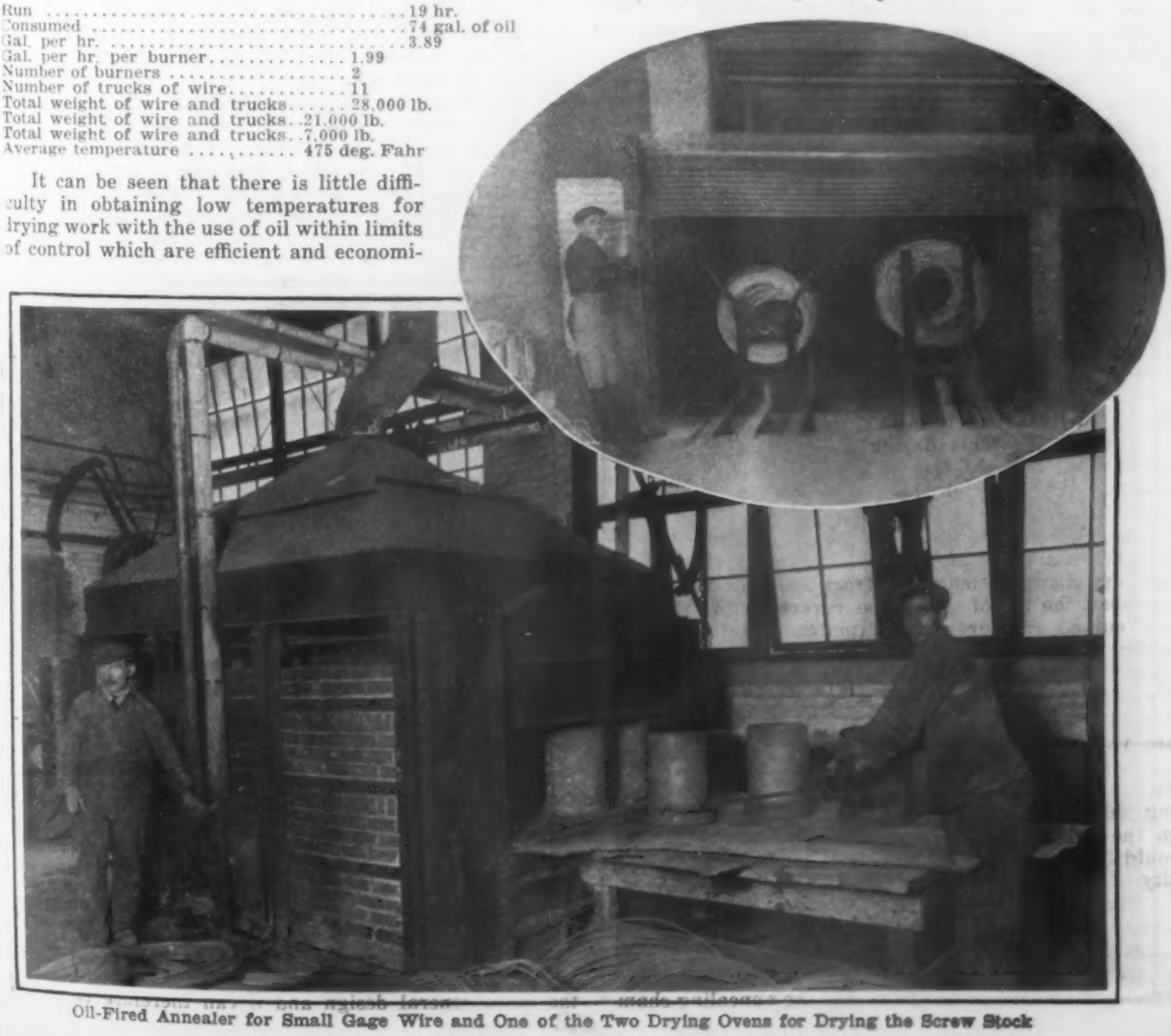
Run	19 hr.
Consumed	80 gal. of oil
Gal. per hr.	4.21
Gal. per hr. per burner	2.10
Number of burners	2
Number of trucks of wire	14
Total weight of wire and trucks	39,000 lb.
Total weight of wire and trucks	28,000 lb.
Total weight of wire and trucks	11,000 lb.
Average temperature	475 deg. Fahr.

Run No. 2

Run	19 hr.
Consumed	74 gal. of oil
Gal. per hr.	3.89
Gal. per hr. per burner	1.99
Number of burners	2
Number of trucks of wire	11
Total weight of wire and trucks	28,000 lb.
Total weight of wire and trucks	21,000 lb.
Total weight of wire and trucks	7,000 lb.
Average temperature	475 deg. Fahr

It can be seen that there is little difficulty in obtaining low temperatures for drying work with the use of oil within limits of control which are efficient and economical and in operations where the necessity of the entire elimination of gases is of prime importance.

The installation described herewith is presented to indicate clearly the fact that a modern, up-to-date organization producing high grade materials in a competitive market has determined that oil burning will give the results necessary and still solve the economical demands. It is believed to be a case which demonstrates that the industry and the technician must still give due consideration to the use of oil as fuel in certain heat-treating developments.



Oil-Fired Annealer for Small Gage Wire and One of the Two Drying Ovens for Drying the Screw Stock

Novel Mechanical Molding of Car Wheels

Foundry Has Moving Platform to Handle Molds from Molding Machines, Through the Pouring Stage and to the Shake-out Machines

FOUNDRIES producing car wheels have been confronted with a number of obstacles which have largely prevented the use of molding machines. The weight and size of the castings and the large amount of sand required for making the molds, together with the space required for the storage of these molds as ordinarily made, created the feeling that many of the economies obtained from the use of machines were difficult to obtain. The desire to cut costs provided the incentive that enabled the Brown Car Wheel Works, Inc., Buffalo, N. Y., to overcome many of these difficulties in rather an interesting manner.

The method of making car wheels is well known, and was analyzed into the following principal divisions:

1—Making the molds, together with the delivery of the sand to the molding floor.

2—Removing the molds from the molding point.

3—Pouring the metal.

4—Allowance of time for cooling.

5—Shaking the castings and sand from the flasks.

6—Removing the castings to the soaking pits.

7—Transporting the sand, properly tempered, back to the storage bins.

8—Returning the flasks to the molding point.

It was decided that, if substantial economies were to be obtained, it would be necessary, so far as possible, to perform these operations mechanically. The installation of molding machines would eliminate much of the labor of making the molds, and the handling of the molds was accomplished by a moving platform, composed of a number of cars, each of suitable size for carrying a mold.

In the outline plan of the installation it will be noted that the cars making up the platform *P* run on a track layout of rectangular shape. The design of the platform is unique in that each car, upon arriving at a corner, without turning, automatically starts in a direction at right angles to its previous motion.

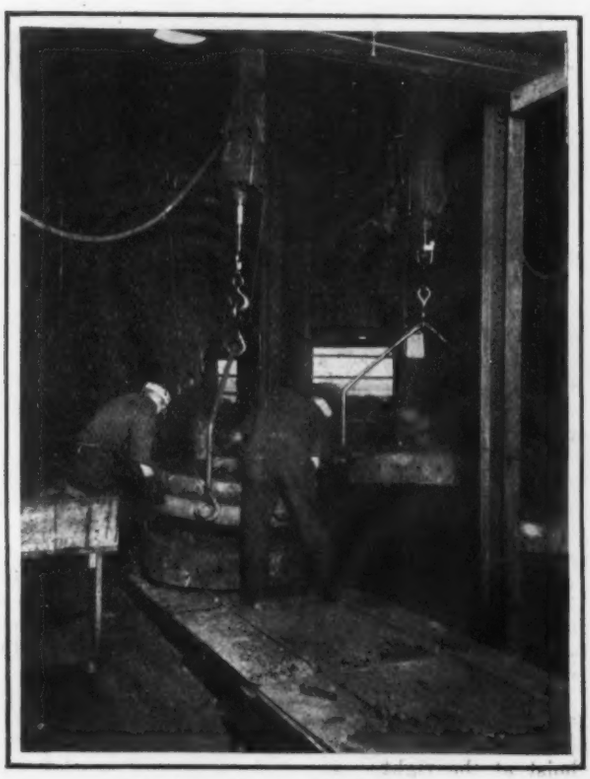
The platform has an intermittent motion, regulated to suit any required condition, and the lines of cars on each side of the rectangle are moved independently. It is operated by pneumatic equipment controlled from station *F*, which is elevated sufficiently for the control operator to get an unobstructed view of the foundry.

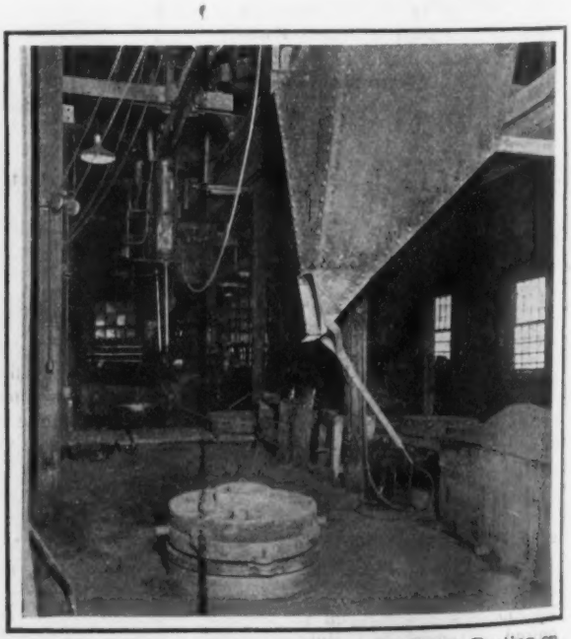
On two sides of the rectangle there is one less car than is required to fill the space completely, and the design of the control is such that, upon movement of the control lever by the operator, the platform on one of these sides is advanced a distance equal to one car, the open space at the end of the line permitting this. The line on the opposite side is next advanced the same distance, these two movements thus leaving vacant spaces at the end of each of the other two lines, thus causing the platform to be moved in increments, each equal to the length of one car.

As the action of the control is semi-automatic, the four sides of the platform cannot be advanced other than in correct sequence, and an emergency stop with which the control is equipped makes it possible instantly to stop any side. The intermittent motion of the platform allows it to have the very desirable feature of remaining stationary while the mold is being closed and during pouring. The cars start very slowly from rest, attain maximum speed and then are very gradually retarded, coming to rest with no appreciable jar.

There is little chance for sand and dirt to get on the track, as it is raised well above the level of the foundry floor, and the sides of the cars not only overhang the track, but, being accurately machined on all sides, are in close contact, thus preventing dirt from falling on the track.

The drags are made on a jar ram roll-over type of machine located at *B*, sufficiently removed from the platform *P* to allow a section of gravity conveyor *C* to be installed, upon which the drag is deposited after ramming and drawing the pattern. The cores are then set, being delivered by the truck *D* from the core room,

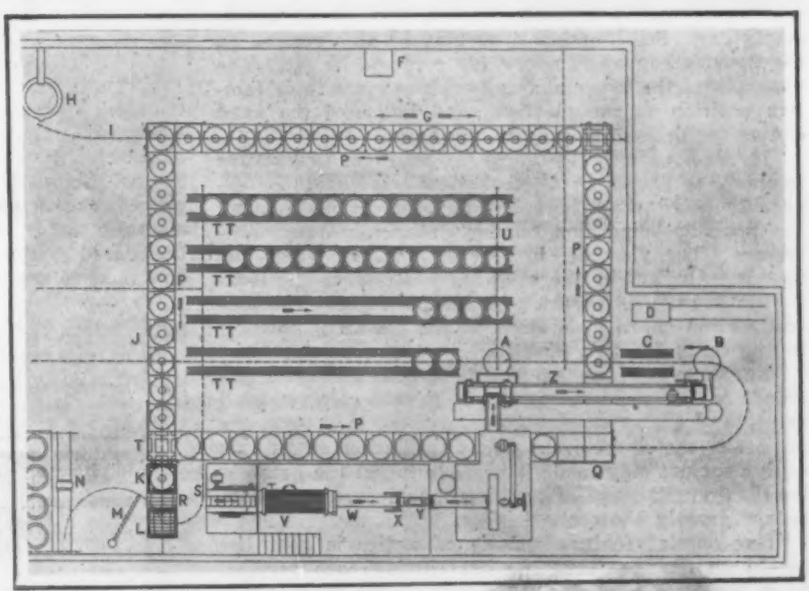




At Left, a Cope Is Being Closed on Its Drag, Resting on the Moving Platform; Another Hangs Near; a Third Is Behind the Column

Above, the Two Molding Machines Are Provided with Sand Chutes to Deliver Sand Directly to the Flasks. Moving platform appears at right, and then runs across between the two machines

Two Men Handle the Pouring, Which Is Done in the Center of Each Mold from a Ladle Carried by a Pneumatic Hoist on a Runway Over the Center of the Moving Platform. This platform remains stationary for the pouring of a mold, and then advances one car-length for the next one



At Right Is an Outline Plan of the Layout, Showing the Location of the Two Molding Machines at *A* and *B*, the Moving Platform *P*, the Pouring Location at G, Receiving Ladle at *H*, Control Stand at *F* and Shake-out Machines at *K* and *L*. Sand-handling apparatus is located at *S* to *Y*

and the drag is slid onto a car of the platform *P*. During this time, a cope has been completed on the machine *A*, and when finished is closed over the drag already resting on the platform. In the meantime, another cope and drag mold are being made on their respective machines.

The movement of the platform brings a succession of empty cars up to receive molds, and advances them to the pouring position *G*, the clamping being done at any convenient point between these two positions.

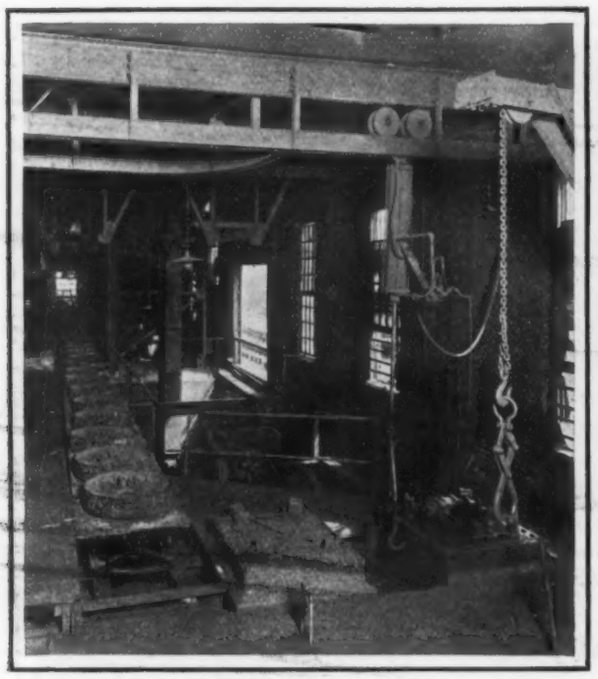
Iron is taken from the receiving ladle *H* in a secondary ladle suspended from an air hoist carried by a trolley running on the track *I*, located directly over the center of the platform. The pouring is done by two men, one standing on either side of the platform, and pouring into the center of the mold. After pouring, the molds are advanced to the position *J*, the time required to travel this distance being allowed for a preliminary cooling of the castings.

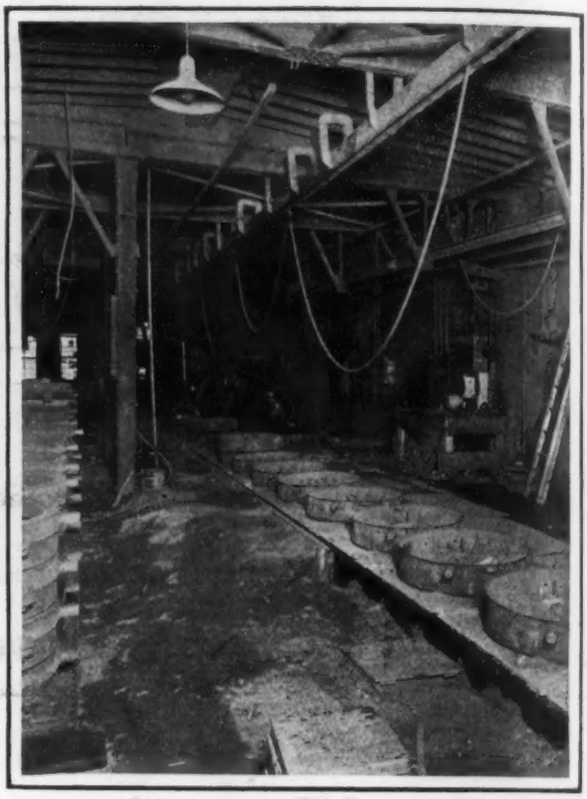
On arriving at *J*, the molds are unclamped and carried by an air hoist to the shake-out machine *K*, and the cope carrying the casting is removed to the shake-out machine *L*. After jarring the sand loose, the drag flask is placed on a car in the position *T* and carried by the platform to point *Q*, where it is removed by a trolley to molding machine *B*. The cope flask is carried by a trolley and deposited on the line of gravity conveyors *TT*, pitched toward *U*.

The chiller for chilling the tread of the wheel is bolted to the cope flask, and as it is desirable to allow time for these to cool, a surplus is provided, stored on these lines of conveyors *TT*. A trolley equipped with an air hoist takes them off from the lower end *U* of this gravity conveyor, and deposits them on the molding machine *A* as required.

Sand, as shaken out of the molds, falls through a grating onto the inclined pan conveyor, which delivers it to a rotary screen, where all heavy material is removed. From the screen, the sand falls onto a belt passing over a magnetic pulley removing any iron, and then into an elevator, where it is carried to the top of the building. Here it is automatically tempered, cut and delivered to sand storage bins over the molding machines.

In the view showing the cope being closed on the drag resting on the platform, it will be noted that another finished drag mold is suspended from an air hoist at the right, ready to be deposited on the next





Above Are the Two Shake-out Machines, with Sand-Handling Apparatus in the Pit, and One Line of the Moving Platform at Left

At Right Is Shown the Pouring Location, with Control Platform Against the Wall at Right and Receiving Ladle Beyond It, Under the Cupola Spout. The track overhead carries the pouring ladle

empty car. Still another drag may be seen resting on the gravity conveyor, ready for cores to be set. The view across the two molding machines gives their relative position to the platform and indicates the sand chutes for delivering sand to the flasks.

It requires only two men to pour for the entire foundry, as shown in another view. It should be especially noted that there are no obstructions around, the pouring being done under practically ideal conditions. The view of this section, taken when the foundry was not in operation, makes clearer the location of the pouring track over the platform. The control station can also be seen on the elevated platform in the center of this picture.

The location of the two shake-out machines with reference to the platform is shown in one view, as well as some of the sand handling equipment located in the pit below the floor level. The installation of all this equipment not only made it possible to get the greatest benefit from the use of molding machines, but also to reduce greatly the cost of labor.

One special feature worthy of notice is that the maximum distance that the hot castings are carried, from the time they are taken out of the molds until they reach the soaking pits, does not exceed 15 ft. This greatly improves the quality of the castings, as they all reach the soaking pits at a uniform heat, which is impossible to accomplish with the old method of pouring, where it was necessary to carry the castings varying distances, up to more than 100 ft.

It is now possible to obtain the same quantity production as formerly, in about one-half the floor space. The loss from bad castings has not only been greatly reduced, but the quality of the castings has been improved, and it is possible to obtain a greater uniformity in weight.

Designed by the Industrial Planning Corporation, engineers, Buffalo, the construction was supervised by E. B. Norris, general manager of the Brown Car Wheel Works. The Hermann Pneumatic Machine Co., Pittsburgh, furnished the molding and shake-out machines; the air hoists were made by the Curtis Pneumatic Machine Co., St. Louis. The Mathews Gravity Carrier Co., Ellwood City, Pa., furnished the gravity conveyors; the sand handling equipment was furnished by C. O. Bartlett & Snow Co., Cleveland. The trolley installation, known as the S-T system, was manufactured by the Whiting Corporation, Harvey, Ill.

French Iron and Steel Production Costs

Some figures on production costs were recently contributed to *Information* of Paris by Albert Despaux, who wrote with the evident purpose of pointing out the distress of the French industry in meeting the competition of Germany and that of countries having a depreciated currency. The cost of materials for producing a metric ton of basic pig iron, a ton of ingots, etc., as translated by the *Iron and Coal Trades Review* of London, is as follows:

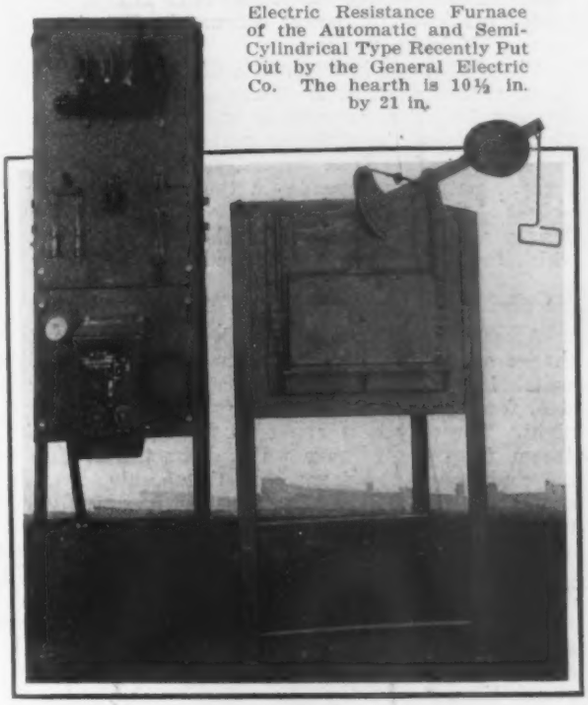
	Francs
3,250 kg. ore at 20 fr	65
1,300 kg. coke at 125 fr	162.5
60 kg. manganese ore at 200 fr	12
1,000 kg. basic pig iron	239.5
1,100 kg. pig iron at 239.5 fr	263 45
150 kg. coal at 110 fr	16.50
Addition of ferromanganese	7
150 kg. limestone at 90 fr	13.50
1,000 kg. ingots	300.45
1,100 kg. ingots at 300.45 fr	330.50
150 kg. coal at 110 fr	16.50
1,000 kg. blooms	347.00
1,120 kg. blooms at 347 fr	388.64
250 kg. coal at 110 fr	27.50
1,000 kg. beams	416.14
1,150 kg. blooms at 347 fr	399.05
300 kg. coal at 110 fr	33.00
1,000 kg. merchant bars	432.05

If account is taken of the recovery resulting from the sale of scale, crop ends and cinder, etc., which represent approximately 35 fr. for a metric ton of blooms and 45 fr. for a ton of beams and merchant bars, it is found that the cost of raw materials comes to 312 fr. for blooms, 371 fr. for beams and 387 fr. for merchant bars. To arrive at the cost prices of merchant bars, it is necessary to add to the latter figure wages (100 fr. per ton), motive power, electricity, works transport, maintenance, supervision, general expenses, etc., which bring the total up to 600 fr. as the minimum for those works which are being operated at present under the least unfavorable conditions. But the home sale price is 380 fr., or 400 fr. at the most, for small orders, figures which only represent the value of the materials entering into the manufacture, but exclusive of all other charges.

NEW HEAT-TREATING FURNACE

Automatic and of the Semi-Cylindrical Type, Insuring Quick Heating

To overcome the objections that have been made to the small electric heat-treating furnace, especially as regards time of heating and flexibility of temperature control, the General Electric Co. has recently developed a new type of automatic furnace, known as the semi-cylindrical type. This furnace, which possesses new and improved features in design and construction, is primarily designed for operation at 1800 deg. Fahr., although by removing the temperature limit fuse it can be safely operated at 2000 deg. Fahr. A description furnished by the company follows:



Electric Resistance Furnace of the Automatic and Semi-Cylindrical Type Recently Put Out by the General Electric Co. The hearth is 10½ in. by 21 in.

The complete equipment consists of the furnace, transformer, automatic control panel and a temperature control instrument which is mounted on the subbase of the panel. The furnace consists of a sheet steel casing, supported on legs, lined with insulating material and having a semi-cylindrical chamber. It is in the design of the heating element that the most radical departure from former types has taken place, eliminating troubles experienced in many small types of furnaces.

The heating element consists of a continuous strip of resistor ribbon formed into an arch or succession of semi-circular turns conforming to the arch of the furnace chamber and extending the whole length of the latter, the proper spacing between turns being maintained by means of insulators. This gives a strong winding which is self supporting and still flexible to expansion and contraction. The two ends of the winding are brought out at the back wall of the chamber, so that the cables of the power supply may be attached. This not only gives a heating element that is strong mechanically but one that gives excellent heating characteristics to the furnace. The heat is radiated direct to the charge and the absence of a muffle allows a lower temperature gradient, as no heat has to be forced through it to reach the charge. Also, since the resistor is of large cross section, the combination of the two factors allows a high power input for the heating-up period with no danger of a burnout.

The heat distribution of the furnace is reported as excellent owing to the spacing of the resistor ribbon, which tends to give uniform temperature from front to back in the chamber. It is also possible to obtain rapid changes of temperature over the range from 1000 to 2000 deg. Fahr. Another feature is that the whole heating unit may be pulled out bodily for inspection or repair, by simply removing the front of the furnace and disconnecting the terminals at the back.

The transformer, which is mounted on the pipe frame of the control board, has four primary coils, insulated from the secondary. The coils may be connected in multiple, multiple-series or series, for 110:220, or 440 volts respectively, at 60 cycles. The secondary has two taps, one 70 volt giving 10 kw. for rapid heating, and the other 50 volt giving 5 kw. for normal operation. A small capacity extension to the secondary is also provided which supplies 110 volts to the contactor coil and for the motor of the temperature control instrument. The transformer is rated 7.5 kw. normal but will give 10 kw. for short periods such as mentioned above, or for one or two hour periods during the day when it is desired to change the temperature quickly.

The control panel carries the furnace contactor, line switch and a double throw switch, which, in its upper position puts the furnace on the 70-volt top of the transformer secondary, and in the lower position on the 50-volt top. The lower position is the normal operation. The temperature control instrument on the lower half of the panel has a scale range of 1000-2000 deg. Fahr., so that the furnace is protected from being set at too high a temperature. If for any reason the instrument should fail, or become inoperative, further protection is provided by a special fuse which melts a little above of 1800 deg. Fahr., opening the main line contactor when it melts, disconnecting the furnace from power supply.

The time required for heating is 1½ hr. from cool to 1560 deg. Fahr. on week-day mornings, when the furnace has been run the previous day, and 2 hr. on Monday morning, or when the furnace is cold.

American Trade with South Africa

Exports from the United States to South Africa increased from $54,891,000 in 1919 to $82,946,000 in 1920. During the same period, shipments from South Africa to the United States decreased from $38,743,000 to $19,063,000, and the "balance" in favor of the United States increased from $16,148,000 to $63,883,000. Principal among the items of iron and steel and other metals imported are those in the following table, which shows also the country of origin. The figures, which are for 1920, show how strongly the mother country is intrenched in the South African market, and at the same time something of what that market is, as a target for American exporters of manufactures of metals. The information was supplied by the United States Vice Consul at Cape Town to the Bureau of Foreign and Domestic Commerce at Washington.

	United States	Great Britain	Germany	All Other
Agricultural implements	$4,654,000	$3,531,000	$75,000	$2,020,000
Arms and ammunition	306,000	2,016,000	....	84,000
Brass and manufactures	76,000	369,000	....	52,000
Copper and manufactures	25,000	192,000	....	17,000
Electrical machinery and material	2,038,000	5,542,000	....	374,000
Enamelware	112,000	485,000	244,000	228,000
Hardware and cutlery	3,849,000	18,419,000	635,000	541,000
Iron and steel manufactures:				
Bars, bolts and rods	218,000	1,895,000	....	388,000
Girders, beams, etc	75,000	453,000	....	1,000
Hoops	75,000	126,000	....	....
Pipes and fittings	69,000	2,022,000	....	16,000
Wrought iron and steel	228,000	2,121,000	....	120,000
Machinery and parts:				
Boilers	57,000	655,000	....	48,000
Engines	174,000	771,000	....	....
Manufacturing and milling	954,000	4,304,000	95,000	326,000
Mining	948,000	2,041,000	....	566,000
Pumps	249,000	492,000	212,000*	18,000
Windmills	617,000	114,000	....	18,000
Rails and railroad material	346,000	720,000	....	111,000
Tin and tinware	18,000	697,000	....	17,000

*Switzerland.

The New England Iron and Hardware Association will hold its annual fall outing at the Tedesco Country Club, Swampscott, Mass., on Tuesday, Sept. 20. Harry L. Doten, Boston, is chairman of the golf committee.

Rotary Furnace for Automobile Parts

Moving Hearth Is an Annular Ring—Heated Electrically and Controlled Automatically —Suitable for Large Variety of Parts

BY A. D. DAUCH*

HEAT-TREATING automobile parts varying in size and characteristics from a small spring clip to a large front axle is now performed at the plant of the Nash Motors Co., Kenosha, Wis., by a large rotary electric furnace, placed in operation a few months ago by the George J. Hagan Co., furnace and combustion engineer, Pittsburgh. The variety of parts to be treated made the problem of design unusually complex, but there was finally selected a rotary furnace with a moving hearth in the form of a continuous annular ring, electrically heated and automatically controlled. The same furnace performs annealing and carbonizing as well.

The furnace (Fig. 1) has the following dimensions:

Overall outside diameter	19 ft.
Overall outside height	7 ft.
Outside diameter of rotating hearth	15 ft.
Inside diameter of rotating hearth	5 ft.
Width of hearth	5 ft.
Height of heating chamber	2 ft.

The furnace walls are of standard construction, bonded throughout with adamant cement. The arch is formed of specially shaped refractories. The entire furnace is heavily insulated with standard material. The furnace structure is encased in sheet steel properly reinforced with structural beams. The furnace hearth is formed of structural members, is properly insulated and has a refractory hearth. The hearth rotates on a series of 20 roller bearings placed at regular intervals about the circumference of the table. Roller bearings mounted on the inner wall of the furnace prevent side play of the rotary hearth. The clearance space between the hearth and the furnace is closed by sand seals to prevent any infiltration of air into the heating chamber.

Two Adjacent Doors Provide for Charging and Discharging

The furnace is provided with two adjacent doors, pneumatically operated, one for charging and one for discharging. A baffle wall extends across the heating chamber between the two doors to prevent the heated pieces being chilled when cold material is charged.

The hearth is driven by an electric motor through a series of gears and gear reduction machinery (Fig. 2) so as to give six speeds of rotation varying from one complete revolution in 30 min. to one revolution in 75 min.

The electric heating equipment consists of 2 sets of nickel chromium ribbon heating elements mounted on the inner and outer walls of the furnace. The first section or heating zone extends approximately two-thirds the distance around, starting at the charging door, and has a connected load of 210 kw. The soaking or finishing zone has a connected load of 60 kw. (Fig. 3) installed to supply the radiation losses in this part of the furnace, at the same time giving enough additional heat to bring all of the charge to a uniform temperature. The main or heating zone is run at a temperature of 1580 deg. Fahr. and the soaking zone at 1525 deg. Fahr. The heating elements in each zone are separately connected to a General Electric control board (Fig. 4). The temperature of each section is automatically controlled and recorded by means of a two point Leeds & Northrup potentiometer. The temperature of each zone can be set at any desired value within the range of the instrument, i. e., 200 to 1800 deg. Fahr. The total connected load of 270 kw. is connected to 440 volts, 3 phase, 60 cycle power service. One hundred and ten volt, single phase, 60 cycle power service is used for control purposes.

In operation at 1525 deg. Fahr., the average efficiency of this furnace has proved to be 11.75 lb. of steel heated per kwhr. of power consumed. This is at the rate of 170 kwhr. per ton.

The charge per hour consists of approximately 3000 lb. of various automobile parts such as spring clips, steering knuckles, connecting rods and front axles. The weights of the different parts vary from 3 lb. to 180 lb. each. The time the different pieces are in the furnace naturally depends on the cross section and weight of the part. This feature of time in the furnace is very aptly taken care of by the different speeds at which the hearth may be revolved.

Castings and Forgings Are Annealed Over Night

After the furnace operator has removed the final charge of material to be hardened and the main line switch is opened, a charge of grey iron castings and steel forgings is placed in the furnace to anneal over night. The only heat employed for annealing is that drawn from the furnace walls. The temperature of the charge and the furnace in the morning averages about 1000 deg. Fahr. The annealed material is then removed and the furnace is again placed in hardening operation. Approximately 40 min. is required to bring the furnace temperature from 1000 deg. Fahr. to 1525 deg. Fahr.

This furnace is also to be used for carbonizing cam shafts. It is planned to charge a total of 18,000 lb. of carbonizing boxes, packing and material in the furnace at one time.

Advantages Over Oil Furnaces

Some of the advantages of this furnace over the box-type, oil-fired furnaces replaced are as follows:

Due to the uniform rate of heat absorption, distortion on long parts, such as axles, has been entirely eliminated.

In the fuel furnaces, regardless of the fineness of control, there was no assurance that all of the parts in the furnace had reached the proper temperature or had not been overheated. In this electric furnace the work is charged at one place and travels for a given predetermined time around the circumference of the furnace before it can be withdrawn. The temperature, heating time and rate of heating are under absolute control and are duplicated with mechanical precision day after day.

Scaling has been practically eliminated in the electric furnace.

The material annealed in the rotary electric furnace now requires only a flash pickle. This formerly was an item requiring 3 to 4 hr.

The scleroscope hardness test on all parts has been increased from 2 to 5 points. The quality of the material by individual test has proven to be more uniform in strength and other physical properties. The item of labor for handling the same number of parts has been cut in half. To date no material treated in the furnace has been rejected due to faulty heat treatment.

Heat Treatment Reduced to a Mechanical Operation

The most important factor, however, as mentioned by the metallurgical men who have charge of this equipment, is that they have been able to reduce heat treatment to a mechanical operation. The furnace operator is supplied with a heat-treating ticket on which is written the number of pieces, drawing number, speed of rotation of furnace hearth and tempera-

*George J. Hagan Co., Pittsburgh.

ture. It is then an assured fact that the particular product will receive the specified treatment regardless of any of the usual conditions affecting a heat-treating operation. Further, this furnace is so well designed and insulated that working conditions have been vastly improved with the resultant increase in productive effort on the part of the furnace attendants. Three men now do the work which formerly required six men.

Power and Load Factors Benefited

From the electrical superintendent's standpoint this electric furnace presents other advantages worthy of consideration. Due to the unity power factor and high load factor, this equipment has materially benefited power and load factor conditions throughout the plant.

The results secured have resulted in the Nash company's placing an order with the Hagan company for a duplicate equipment of smaller physical characteristics for similar work.

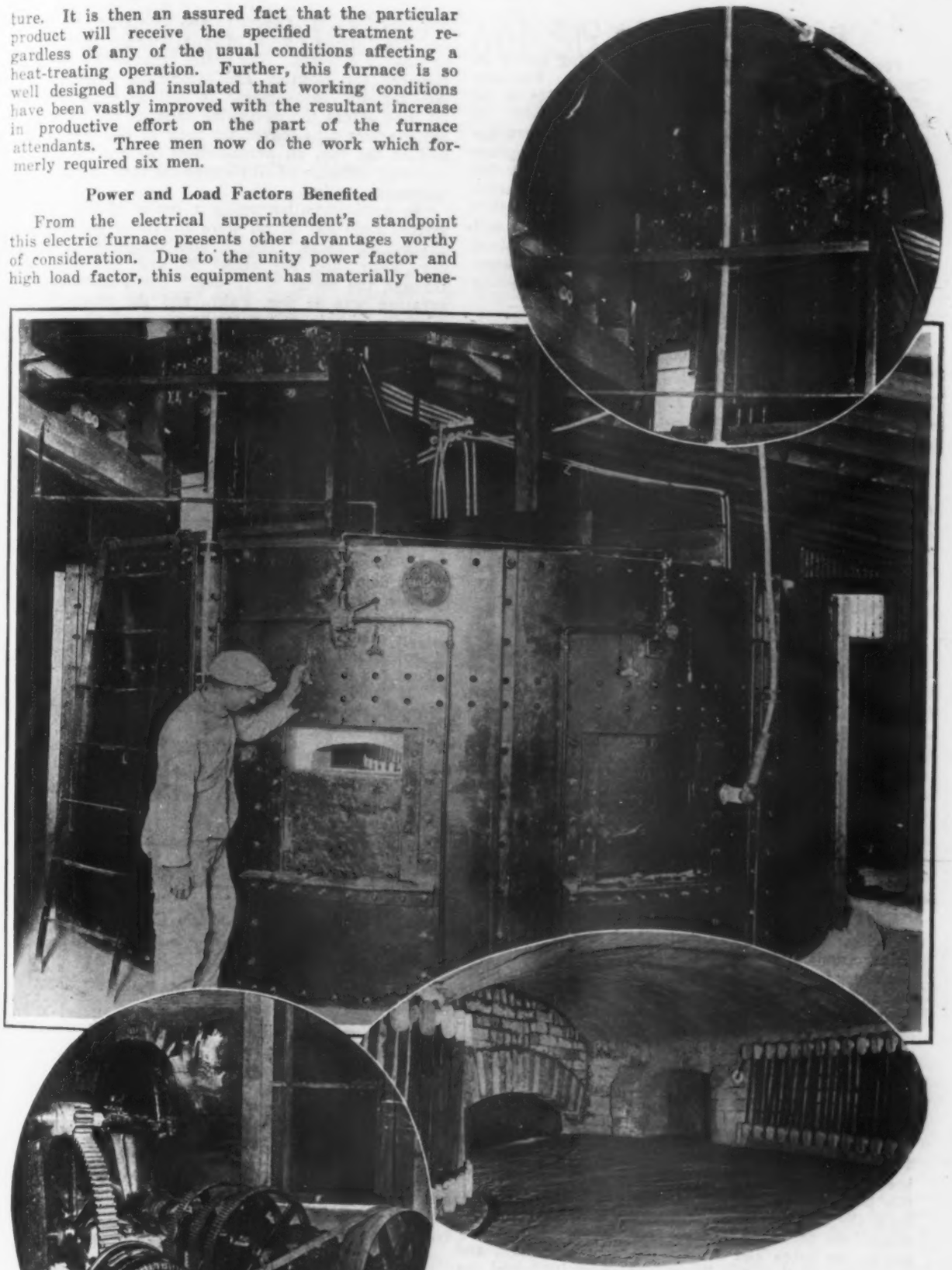


Fig. 1 (In the rectangle)—This Rotary Furnace Has an Outside Diameter of 19 Ft. and a Height of 7 Ft. The furnace structure is encased in sheet steel, reinforced with beams

Fig. 2 (In the bottom circle)—The Hearth Is Driven by an Electric Motor Through Gears and Gear Reduction Machinery. There are six speeds of rotation

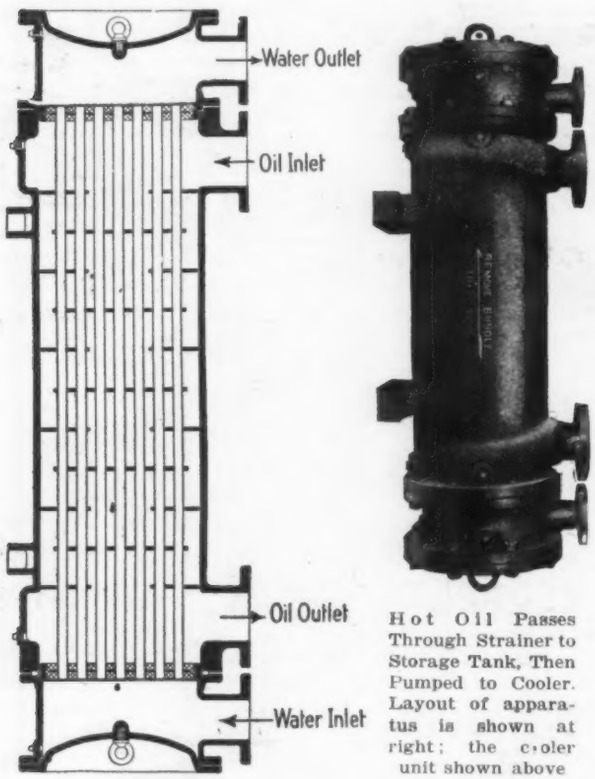
Fig. 3 (In the oval)—The Soaking or Finishing Zone Has a Connected Load of 60 Kw. It is installed to supply the radiation losses in this part of the furnace, at the same time giving sufficient additional heat to bring all of the charge to a uniform temperature

Fig. 4 (In the top circle)—The Heating Elements in Each Zone Are Connected Separately to a General Electric Control Board

Recooling Quenching Oil*

Proper speed of cooling is a determining factor in the degree of hardness bestowed upon steel. The rate of cooling depends upon the size of the piece to be hardened and upon the composition of the steel. It depends also and perhaps to a greater degree upon the rapidity with which the cooling or quenching medium removes the heat, which is in turn determined by the nature of the medium, its fluidity or viscosity, specific heat and temperature.

The particular cooling temperature of oil that will give the best hardening results should be ascertained first, then a suitable recooling system provided to maintain that temperature. Several methods of recooling



Hot Oil Passes Through Strainer to Storage Tank, Then Pumped to Cooler. Layout of apparatus is shown at right; the cooler unit shown above

quenching oil are in use, but circulating the oil in a closed circuit and recooling it in a separate cooler has met favor in modern practice. The accompanying illustration shows an arrangement of apparatus used in this connection. The heated oil is removed from the top of the quenching bath and passed through a strainer to a storage tank, from which it is forced by an oil pump to the cooler, wherein the oil is cooled and thereupon returned to the quenching tank.

The oil cooler unit is shown in the illustration. It is made up of a smooth bore cylindrical cast iron shell to the ends of which are attached cast iron headers. Within the shell there is a bundle of straight tubes of brass or copper through which cold water passes from one header to the other. The headers are separated from the cylinder by the tube sheets. The heated oil flows into the shell at the top, passes transversely across the tubes and around the annular baffles, and leaves the shell at the bottom. During its travel the oil strikes the tubes approximately at right angles, splitting into many fine streams. The water flows in an opposite direction to the oil.

The tube sheets are of composition metal into which the tube ends are cast. The upper tube sheet is rigidly secured to the shell, the lower one forming a floating head construction, which provides for the expansion and contraction of the tubes. The composition material of the tube sheets is dense and its melting point is around 550 deg. Fahr. It does not disintegrate at the temperatures met in practice. The packing between the headers and the shell consists of two rings of rubber separated by one of brass and practically prevents any mixing of the oil and water. All joints on the cooler are external and leakage can be quickly detected. The entire tube bundle is readily removed for cleaning and inspection, without breaking the oil connections. It will be noted that the oil pipe enters the quenching tank at the bottom and the overflow pipe leaves the tank at the opposite side and at the top, an arrangement designed to effect a thorough diffusion of oil through the tank and to effect a maximum cooling.

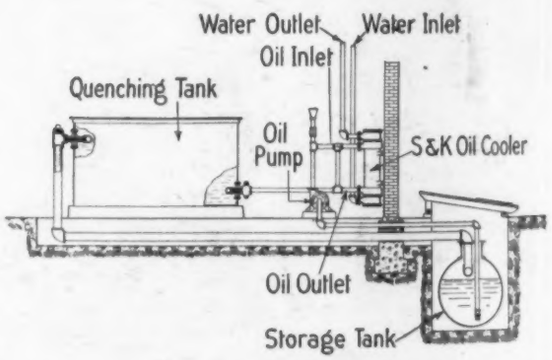
In an installation using a cooler of the type described 3000 gal. of oil were circulated per hour and 774 gal. of water. The oil inlet temperature was 118 deg. Fahr. and the outlet 96 deg., giving a drop through the cooler of 22 deg. The water inlet temperature was 35 deg. Fahr., and the outlet 75 deg., giving a rise in water temperature of 40 deg. The furnace temperature was 1500 to 1550 deg. Fahr. A No. 3 Gould pump driven by a 5-hp. motor, the pump running at 152 r.p.m., was used. The suction of the pump was 2 in., vacuum, and the discharge 32 lb. gage pressure. The length of the cooler described is 64½ in. overall, the diameter of the shell 14 in. and the weight 1000 lb.

The heat surrendered by 1 lb. of steel during quenching as for example, from 1550 deg. Fahr. to 150 deg., is 240 B.t.u. General practice is to specify 1 gal. of oil for every pound of steel quenched per hr.

If we assume a specific heat of oil equal to 0.487 and a density of 7.25 lb. per gal., the temperature rise produced in 1 gal. of this oil by 1 lb. of steel, is equal to $240 \div (0.487 \times 7.25) = 68$ deg. Fahr.

In other words, if the initial temperature of the 1 gal. of oil is 80 deg. Fahr., it will be increased to about 148 deg. by the quenching.

If 3000 gal. of oil are to be circulated per hr. through the cooler, the oil circulation per min. is 362.5



lb. If a water-to-oil ration of unity is chosen, that is, if the same weight of oil is circulated per min. through the cooler as weight of water, we can find the temperature drop of the oil circulated through the cooler. The temperature drop we find to be about 20.5 deg. Fahr. For 2 to 1, 4 to 1 and 6 to 1 water ratios, the temperature drops are 24, 26.5, and 27.5 deg., respectively. Thus, beyond a certain point, increase in the quantity of circulating water does not produce a proportionate temperature drop in the oil.

*From an article copyrighted by S. E. Derby, engineer, Schutte & Koerting Co., Philadelphia.

Less Unemployment in Pennsylvania

HARRISBURG, Sept. 5.—Public works projects, recalls of railroad workers to shops and resumption of industries here and there have improved the unemployment situation at a number of points in Pennsylvania, and reports to the State Bureau of Employment headquarters from Philadelphia and Pittsburgh are slightly more encouraging than in the middle of August. A summary of reports of branch offices of the State Department of Labor and Industry shows more than 250,000 workers listed as idle and registered at the bureaus. The summary of the unemployed registered for work by districts is as follows: Altoona, 18,860; Erie, 14,825; Harrisburg, 13,455; Johnstown, 18,840; McKeesport, 5075; New Kensington, 6050; Philadelphia, 127,000 men and 12,050 women; Pittsburgh, 5665; Scranton, 16,020; Williamsport, 5350.

Electric Furnace Tool Steel Qualities

Vital Considerations in Practice Insuring Regularity—Rôle of Purity of Stock—Some Specifications—Alloy or Reinforced Steels

BY W. J. AND S. STUART GREEN*

"IT is one thing possessing a fiddle and another thing being able to get good music out of it," said a prominent steel man in addressing a rather large gathering of local steel-makers in Pittsburgh, on electric furnace efficiency, which apt expression seems to us, to cover the case of electric furnace tool steels. Certain it is, the electric furnace has yet to come to its full fruition for, unlike all other processes of steel manufacture, its limits have yet to be reached or even correctly defined; hence there is abundant room for more highly technical skill of an exclusive character, bearing in mind that its ultimate product is largely sold on quality rather than price. It is not, except in rare circumstances, a competitor of the open hearth furnace for its quality is altogether beyond that, but it does frankly challenge the best work the crucible can do.

It is not the purpose of this paper to consider electric furnace costs, pit-practice or refractories, as each would require a separate paper were anything more than a shallow treatment attempted. It is furnace practice in-so-far as it controls quality to which the writers have confined their attention. The great majority of electric furnace tool steels being made in basic furnaces, the writers deal only with basic practice.

Materials for Furnace Bottoms

High grade steel cannot be made on a poor bottom; it is therefore emphasized that good bottom materials are as essential as good melting stock and should be sought with the same care. It is not economy to use up old stock already largely disintegrated and, while speaking of economy, the writers wish to say that they have not always found the most expensive bottom material the best, nor likewise have the cheapest materials, as far as first cost goes, proved ultimately so. Discrimination has to be used and, having once selected a satisfactory material, it is well to hold on to it permanently. The curb should be held tightly also on the purchasing department; very liberal powers should be given the electric furnace department in the purchase of all its materials. However, having secured good bottom materials by no means renders a furnace immune from bottom trouble; careful fettling, the thorough cleaning out of all steel puddles and very careful watching of the bottom height are absolute essentials, if one desires freedom from such.

Burnt lime used for basic slags should be selected with considerable care, probably more so than is generally accepted. Slags readily formed are a blessing worth searching for, likewise slags with strong sulphur reducing properties. These virtues are possessed by few limes but, where found, are probably one of the largest money savers handled. First cost is entirely secondary where such a commodity has been secured. A burnt lime of the following average composition served the writers very well:

Ignition loss	11.24 per cent
Silica	1.24 per cent
Iron and alumina	Trace
Lime	86.06 per cent
Magnesia	0.62 per cent

*Pittsburgh.

In spite of a very keen appreciation of the abilities of open-hearth men, the writers deplore the frequent employment of such skill in the control of electric furnaces. It seems to us very much like retaining a heart specialist on a nose and throat case. It should also be said that the electrical department sometimes possess advanced ideas as to the proper operation of a furnace. It has been our experience however that the safest course is to stear clear of all such ideas except where they affect the proper care of apparatus.

High Grade Stock Essential

In the making of best tool steel there is no room in the electric furnace for low grade melting stock, with its attending refining. Final analysis, however excellent, is liable to be highly deceptive if used alone for grading quality, as very much more than analysis is required to constitute the best tool steel. It should always be borne in mind that tool steel making is an art as well as a science. We of course thoroughly believe in analysis in adherence to specification, but we also emphasize the necessity of specifications being drafted by someone who knows where quality comes in, indeed some final latitude of revision should be left in the hands of the steelmaker.

The electric furnace is, fortunately or unfortunately, such an excellent refiner that there is great danger of this feature being very much overdone and cheaper stock being used where best and more costly materials would ultimately prove economical. It is with the foregoing in mind that the writers have itemized the following major considerations affecting quality, which are the result of many years experience in tool steel making, both crucible and electric. They are, however, purely the opinions of the authors, carefully tried in every day practice, and are advanced as such.

FIRST GRADE.—Duplicating First Quality Crucible Steel.

General Specification: Mn, 0.10 to 0.25; Si, 0.15 to 0.25; P and S, 0.020 per cent maximum.

Charge to consist of all heavy melting stock, insuring little oxidation, cleaner stock and only one charge.

Heavy melting stock to be well under above specification in manganese and phosphorus Swedish, "American Swedish" rolling mill iron, ingot iron or similar stock being desirable except as hereafter provided.

Charge shall contain not less than 10 per cent of washed metal or Swedish carbonizing iron, and up to 33 per cent where carbon will allow. Carbon should be figured to just under limit of the specification.

Not less than 20 per cent but preferably up to 40 per cent of heavy electric furnace tool scrap shall be used in all charges. This of course replaces, to the amount used stock described above.

Positively no ore additions, mill-scale or boiling of any kind tolerated. Manganese and phosphorus being well under specification as provided, without such manipulation This means also that no slag shall be taken off.

Final carbon to be adjusted with washed metal or its equal. Heat should be under a white slag for at least one hour before tapping.

No ladle additions of any kind excepting aluminum should be made.

Operating trouble of any kind degrades heat according to degree of trouble.

Every attempt should be made to duplicate crucible conditions both in melting and casting practice.

The following charge indicates a hypothetical first-grade heat:

Quality.—38D-E (first grade tool steel).

Specifications.—C, 0.95 to 1.05; Mn, 0.10 to 0.25; Si, 0.15 to 0.25; P and S, 0.020 per cent.

	Lb.
Electric furnace heavy 38D-E scrap	5,000
Rolling mill iron (C, 0.10 per cent)	7,000
Washed metal (C, 3.50 per cent)	2,000
	14,000

SECOND GRADE—A General Purpose High Grade Tool Steel. *General Specification:* Mn, 0.20 to .35; Si, 0.20 to .30; P and S, 0.015 to 0.030 per cent.

At least 50 per cent of the charge should be heavy melting stock, the balance medium or light, but not sufficient of this latter to necessitate a second charge, which should be avoided.

The heavy melting stock used other than described in next paragraph should be standard open-hearth heavy low phosphorus analyzing phosphorus and sulphur 0.03 per cent maximum; nickel and chromium, under 0.15 per cent each, or equivalent stock.

Not less than 20 per cent but preferably up to 40 per cent of medium and light electric furnace tool scrap should be in charge.

Sand cast low phosphorus pig iron (maximum 0.03 per cent P) or its equal should be in the charge sufficient to melt approximately where desired in carbon. A minimum of 10 per cent should be used.

Heats should be finally adjusted for carbon with washed metal or its equivalent; 500 lb. should suffice; where more than this is required, the jump or part of same should be made with carburite or other satisfactory method.

Partial refinement by usual boiling and slag off is to be tolerated, though not of a drastic nature; or reduction of manganese where necessary, by this means, is permitted. Of course where the previous paragraphs have been followed very little will be necessary and, where feasible, mixture should be designed to eliminate even this manipulation.

In the event of a slag off heat the bath should be carburized with crushed electrode or carburite immediately after the slag off on the bare metal by the usual method. This should be figured as close as possible to specification, but if a further big jump should subsequently be found necessary it should be made with carburite as explained above. Any first-grade heat that has had to be boiled to knock carbon, etc., or has been in other ways a trouble heat, should be included in this grade, always providing the trouble has not been serious enough to further degrade it. This heat should be under a white slag for at least one hour before tapping.

No ladle additions excepting aluminum should be made.

The following charge indicates a hypothetical second-grade heat:

Quality.—FA4 (high-grade general purpose tool steel).

Specification.—C, 0.95 to 1.05; Mn, 0.20 to 0.35; Si, 0.20 to 0.30; P and S, 0.025 per cent maximum.

	Lb.
Medium and light electric furnace FA4 and 38D-E scrap	5,500
Open-hearth heavy low phosphorus scrap	7,000
Sand-cast low phosphorus pig iron (C 3.50 per cent)	1,500
	14,000

A very light boil only will be required to bring this well in specification in manganese and phosphorus required amount of carbon will of course be beaten in immediately after the slag off and finally adjusted with washed metal.

THIRD GRADE.—The Electric Furnace Saleman's Conception of a First Class Tool Steel. *General Specification:* Mn, 0.20 to 0.70; Si, 0.20 to 0.30; P and S, 0.015 to 0.035 per cent.

Heavy, medium and light open-hearth or Bessemer melting stock for major portion of charge.

Free use of pit scrap, skulls, light electric, dirty scrap, etc. Second charging is permissible, i.e., light scrap may be used in quantities as available or desirable.

Crushed limestone may be used entirely for both slags replacing the burnt lime of the better grades.

No washed metal or low phosphorus pig iron should be used for carburizing.

Coke, crushed electrode or carburite should be used for carburizing; added in cold charge in single slag heats or on bare metal after slag off in multiple slag heats.

Final adjustment of carbon with carburite except in those cases where time might be saved with a minimum amount of washed metal.

A 5-point carbon coking in ladle is permissible.

Boiling with ore, etc., and subsequent slag offs of any severity, necessary to finish in specification, is permitted; no limit on amount of ore, excepting, of course, that as little as possible to come in limits will be used.

Short cuts assisting production are permitted, such as soaking electrodes, tapping on fair slags, the freer use of aluminum, etc.

Utilization of accumulations of undesirable scraps can be effected.

While this is a third-grade product, it should be firmly kept in mind that it is a general purpose tool steel and as such should be melted and poured with care and attention consistent with the economies above described, in fact, an attempt should be made to neutralize the deficiencies of melting stock, etc., by more scrupulous care.

It will be seen from the foregoing that native purity of melting stock is worth its price where quality is the first consideration. It will also be seen that no corruption of open-hearth ideas, which represent a very different process, is sought. It is recommended that standard mixtures be formulated and strictly adhered to, avoiding the habit of rigging up a fresh mixture for every heat. Time and thought spent in the exact classification and storage of melting stock is effort that is also well repaid; indeed it is futile to attempt any quality work on any other basis; for quality, if it means anything at all, is a definite standard that can be repeated identically and without deviation every time, not occasionally or by chance or accident, and the very essentials are fundamentals that cannot be conjured with by clever reckoning.

Purity of Melting Stock

The basis of a lasting connection built up by quality is only secured by the foregoing means. It was one of the outstanding features of the old "rule-o'-thumb" steelmakers that they were able to reproduce their qualities with unerring accuracy and it is doubtful, in so far as carbon steel is concerned, whether their first water carbon product has ever been excelled; such product being largely the result of skill and judgment, some of this needs applying to the manufacture of tool steel by the electric process, analysis notwithstanding. Of course training and experience is needed to gain this desideratum and it is only by such that the quality end of electric furnace practice can be fully exploited. We have always looked with some distrust on ingenious furnace manipulation, frequently discovering a formidable "nigger in the wood pile" on close investigation. Therefore we stand firmly for stable standard practice.

Alloy or Reinforced Steels

These are the days of alloy steels or "re-inforced steels," so much so that one is apt to forget the great weight of straight carbon tool steels produced by the crucible process, which is yet to be captured by the electric furnace. Wherever electric furnace qualities are judged almost entirely by analysis, the capture of this business can not, in the writers opinion, be any unqualified success.

The alloy steel field is largely an electric furnace one and the considerations, outlined for carbon tool steels, can be readily applied to their manufacture, imposing very few modifications and these in strict conformity with the basic ideas of quality grades outlined.

The writers have made a considerable quantity of alloy tool steels, including a large amount of high-speed steels, the manufacture of which has been strictly governed by the general principles laid down in the foregoing. It should be said however that the manufacture of alloy steels offers certain liberties, such as the use of alloy ores rather than the reduced metals. Their use is of questionable wisdom in steels of the first quality. A desire for tonnage has, in some cases, suggested the withholding of alloys till late in the heat

in order to facilitate quick preliminaries and consequent quick heats. This has never been the practice of the writers, it being their concern as to how soon they could have the alloys in. Late additions therefore are not advised unless it be possibly in third quality work.

It is also a weakness of some furnace operators to regard an alloy steel as a reinforced steel and therefore able to withstand a certain amount of abuse in melting, but unfortunately by so doing they undo the virtues sought after as this reinforcement is used up to a degree in neutralizing melting deficiencies. It is sometimes felt in alloy work that the actual stock is only a vehicle for the alloys and therefore not required to be of superlative quality itself.

All these ideas however are contrary to actual fact and tend only to place the electric furnace in a subordinate position to the one it should hold, that is, a modern economic tool steel furnace. A first quality alloy tool steel must have a first quality tool steel base, the melting stock and the melting practice must be of a quality strictly in accordance with the desired quality of the finished steel. The addition of alloys to a second quality carbon tool steel can not make it a first quality alloy steel.

In conclusion, the success of the plan depends on the strict and faithful adherence to the considerations set forth and it is the writers' experience that such adherence is very adequately rewarded.

Tax Payments on Appreciated Capital

WASHINGTON, Sept. 13.—Taxpayers who have included appreciated values in determining invested capital contrary to the decision of the United States Supreme Court in the La Belle Iron Works case may file amended returns and pay their taxes within 90 days from Aug. 26 without penalty. This important ruling of the Treasury Department has been issued as T. D. 3220 and relates to income and excess profits tax returns for 1917 and subsequent years.

The ruling follows:

An examination of income and excess profits tax returns for 1917 and subsequent years has disclosed that many taxpayers have used appreciated and inflated values in determining invested capital shown in such returns contrary to section 207 of the revenue act of 1917 and section 326 of the revenue act of 1918.

This office has held consistently that the use of appreciated or inflated values in determining invested capital is not permissible and this ruling has been sustained by the United States Supreme Court in the case of the La Belle Iron Works v. The United States.

All taxpayers who, in the preparation of their income and excess profits tax returns for 1917 and subsequent years, have used appreciated or inflated values in determining the amount of their invested capital are required to file with the collector of internal revenue within 90 days from date of this decision amended returns for each of such years, in which the invested capital shall be computed strictly in accordance with the law and regulations and without the use of appreciated or inflated values. It is not required that such amended returns shall include the figures shown in the original returns which are unaffected by this decision. Only such figures as are necessary to show the correct values used in the computation of invested capital and such totals as are necessary to a redetermination of the tax need be shown. Payment of the additional tax shown to be due on such amended returns must also be made at the time the returns are filed.

Failure to file amended returns within the time specified will subject taxpayers to the penalties provided for in section 3176, United States revised statutes, as amended.

The Colorado Fuel & Iron Co. has announced the virtual closing of its plant at Pueblo, Col. The company will also suspend operations at its iron mine at Sunrise, Wyoming, as well as at several coal mines.

The Reed Foundry & Machine Co., Kalamazoo, Mich., has increased its capitalization from $250,000 to $1,000,000.

Unusual Traveling Crane for Ford Railroad Shop

An electric traveling crane having some unusual features is now being built for the River Rouge plant of the Ford Motor Co. The crane will be installed in the locomotive repair shop where all the repairs to the motive power equipment of the Detroit, Toledo & Ironton Railroad are made. The shop is rectangular in shape and was originally designed for a general repair shop for the Rouge plant but later was converted into a locomotive shop. It was found desirable and necessary to move the locomotives with the crane the length and width of the building and in addition to spot the locomotives at any angle with the bridge girders of the crane. This necessitated a crane having a hoisting unit of the usual design mounted on a turntable with individual motor drive above the hoist truck, so that the hoist unit may be turned through a complete circle. The Shaw Crane Co., of Muskegon, Mich., submitted a design which was approved. The crane is to have a 100-ton main hoist with a 25-ton auxiliary and a bridge span of 55 ft. The hoist truck is of the eight wheel type mounted on two bridge girders. The equipment is to be electrically driven and controlled from a suspended operators cab.

To Survey Commercial Laws of Foreign Countries

WASHINGTON, Sept. 13.—The new division of commercial laws of the Bureau of Foreign and Domestic Commerce soon will begin a world-wide survey of the commercial laws of foreign countries on a scale greater than is said to have ever been attempted by a government agency. A. J. Wolfe, recently appointed chief of the division, is in New York, where he will remain until Thursday of this week, and is conferring with lawyers and business men interested in the undertaking.

A series of carefully prepared questionnaires, it is announced by the Bureau, will form the basis of the survey. These will be sent to legal authorities throughout the world selected by representatives of the bureau and through the co-operation of representatives of the Department of States in foreign countries.

When the material has been gathered it will be edited in the bureau and prepared in the form of special booklets as follows:

"Doing Business under Foreign Laws," with full particulars as to the operations of foreign branches of American firms, organizing companies under foreign charters, taxation, etc.; "Agency Laws of the World," with proper forms for powers of attorney; Bankruptcy Laws of the World; Negotiable Instruments Throughout the World; Sales Contracts and Foreign Laws; Commercial Disputes Before Foreign Courts.

High Cost of Metric System Compulsion

WASHINGTON, Sept. 13.—Compulsory introduction of the metric system would cost 31 companies $21,464,688 or an average cost for each of $715,489.60, which for each worker employed would be $227.40, according to the American Institute of Weights and Measures, which is conducting a campaign in opposition to such legislation. The figures are based upon a questionnaire canvass conducted by the institute. As already stated in THE IRON AGE, hearings will be held upon a bill introduced by Senator Ladd of North Dakota providing for the establishment by law of the metric system after 10 years.

Should the bill be passed, all trade, the Institute of Weights and Measures states, would have to be carried on at the expiration of the period named in a system now strange to the American people. All postage, excises, duties and customs charged and collected by the Government would also have to be based on the metric system, the units of which bear no simple or easily remembered relation to the weights and measures now in use.

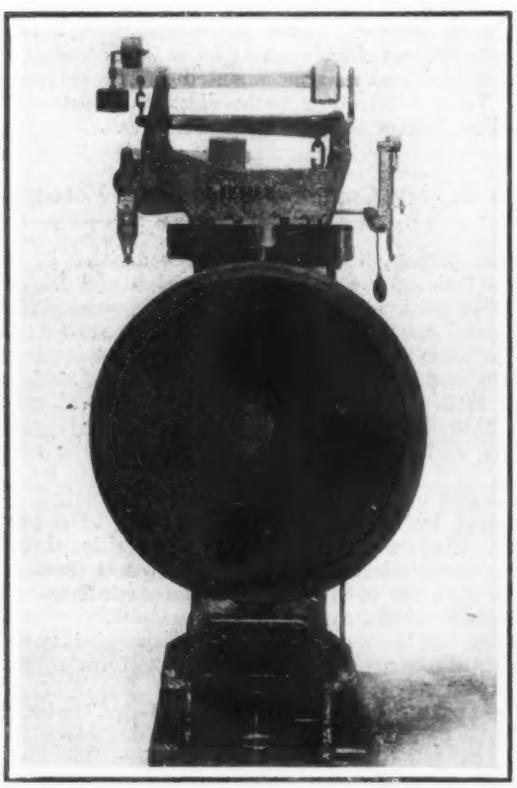
HARDNESS OF CHILLED WHEELS

Machine for Determining Brinell and Shore Values on Same Spot

The problem of making comparative Brinell and Scleroscope hardness test on identically the same spot of metal and on large size pieces has come to be a difficult task where speed of operation and the number of tests made are to be considered.

The Association of Manufacturers of Chilled Car Wheels determined upon an exhaustive study of the hardness of chilled wheels as compared to their wearing and breakage qualities. The makers want to know if any relationship exists and, if so, what it is. Incidentally they expect to determine the value of the hardness test as an indication of the general serviceability of the chilled iron wheel.

This study requires hardness tests by both the



The Special Hardness Testing Apparatus Devised by Riehle Bros. to Determine the Brinell and Shore Hardness of Chilled Iron Wheels at the Same Spot

Brinell and Scleroscope methods and on the same spot. No machine was available for this work. The problem was submitted to the Riehle Brothers Testing Machine Co., Philadelphia, and, after several conferences with representatives of the association, the machine herewith illustrated was designed and built in the Riehle works. It shows a 33-in., 700-lb. car wheel in position ready for the Brinell test. The method of registering the Brinell load is the Riehle lever and beam system which is said to be more dependable than a hydraulic gage reading. At the rear of the machine is shown the familiar Shore scleroscope. The scleroscope and Brinell weighing systems are both carried by the same housing which housing is bolted to a turn table so the whole upper part of the machine can be revolved with the Brinell ball and scleroscope dart in the circumference of the same circle.

To test a wheel the turn table is revolved 90 deg. from the position shown and a car wheel rolled into place resting on the two grooved rollers; an inclined track runs up to the rollers making it easy to push a wheel into place. The turn table is now revolved until the scleroscope comes over the wheel. When the center position is reached, a pin flies into a hole of the turn table and locks it. The scleroscope is now lowered by its rack on to the wheel and the test reading made. The scleroscope is raised, pin withdrawn by the eye shown, turn table revolved 180 deg., when the pin again locks it; the ball is in position directly over the spot tested by the scleroscope ready for the Brinell test. The rollers supporting the wheel rest on a hydraulic plunger and a few strokes of the hand pump shown raise the wheel against the ball. When the wheel touches the ball an initial reading of the depth indicating device is taken. A few more strokes of the hand pump put on the full Brinell pressure which is indicated by the beam rising in the gate. A by-pass valve is momentarily opened, wheel lowers slightly, a stroke or two of the hand pump again puts the wheel just in contact with the ball and another reading of the depth device taken. The difference between this and the first reading gives the actual depth of impression even eliminating any flattening there may have been in the ball.

The by-pass is again opened, the wheel lowers and it is then revolved to a new position for testing. Thus a series of tests can be made around the wheel.

The depth indicating device is entirely new and rests in the Brinell head directly above the ball. Two fingers rest on the wheel while a third one rests on the ball. The relative motion of wheel and ball is thus registered without any intervening mechanism and the most accurate depth readings possible are thus obtained.

British Bid Low for Uruguay Bridge

WASHINGTON, Sept. 13.—With a bid of 977,680 gold pesos, interests representing British fabricators submitted the lowest tender to build the Santa Lucia River bridge in Uruguay, according to a cable received by the Bureau of Foreign and Domestic Commerce. Interests representing American and German fabricators submitted bids also, the American figure being lower than the German bid. The American quotation was 1,081,444 gold pesos while the German bid was 1,084,595 gold pesos. At the present rate of exchange a gold peso is equivalent to 64.33c. The bids represent an almost complete reversal of those which have been made up to recently in South American countries. The German interests, now the highest bidders, have been the lowest, while the British interests, now the lowest, frequently were the highest. It is indicated that competition for business among steel interests of the world has developed to a keen point and that German interests are forced to ask higher figures than heretofore on business, some of which they are said to have been compelled to abandon because of inability to make delivery.

The Link-Belt Co., Philadelphia, will supply the machinery for two locomotive coaling stations for the New York Central Railroad at Solvay and Wayneport, N. Y. The plant at Solvay will consist of a 1000-ton reinforced concrete structure, equipped with 12 undercut gates and coaling chutes, and 12 sand gates and spouts, with necessary piping; two 24 x 36 in. gravity discharge elevator-conveyors having a capacity of 80 tons per hour of run-of-mine coal, etc. The station at Wayneport consists of a 400-ton steel pocket, six coaling gates and chutes; one 24 x 36 in. gravity-discharge elevator conveyor, etc.

An address on "Micro-Motion Study for Current Use," styled "a further indictment of stop-watch time study," is to be made by Dr. Frank B. Gilbreth, consulting engineer, Montclair, N. J., before a meeting of the New York section of the Taylor Society on the evening of Sept. 15, at the Flatiron Building Restaurant, New York. R. H. Wessmann, care of J. F. Tapley Co., Metropolitan Building, Thompson Avenue and Court Street, Long Island City, is in charge of the meeting.

Machinery for the manufacture of corn products and by-products is desired by the Standard Investment Corporation of South Africa, Ltd., Permanent Buildings, Harrison Street, Johannesburg.

New Trumbull-Cliffs 600-Ton Blast Furnace

Plant Completed in Record Time—Compact Arrangement for Labor Saving—Provision for Expansion of Plant and Enlargement of Furnace Hearth

WORK on the new 600-ton blast furnace plant of the Trumbull-Cliffs Furnace Co., Warren, Ohio, was started Aug. 15, 1920, and completed June 14, 1921. In less than ten months an open field on the Mahoning River, across from the Trumbull Steel Co., without railroad connections, was completely transformed: material and equipment were erected and placed in position, tracks were put in, the yard graded and fenced in, machinery turned over and the plant made ready to produce pig iron. This is believed to be record time for construction of a complete blast furnace plant.

Arrangement was made in the layout for the future installation of additional blast furnaces, as well as for a by-product coke plant. Throughout the design, provision is made for extension without interruption at the pumping, power and boiler houses, furnace and cast house, stock house and stock yard, casting, switching and other operations. Moreover, an extension of water lines, sewers, transmission lines, tracks, stock house and stock yard develops with minimum expense and effort from the existing units. As a typical example of provision for expansion, the boilers are so designed, with high settings and distinct combustion chambers for gas and coal firing, that stokers may be installed in the existing settings and the electric power output of the plant increased up to 12,000 kw. Improvements have been introduced which experience of the last few years has taught.

Present rail connections are the Pennsylvania and Erie railroads across the Mahoning River, but an additional connection is to be provided, at the opposite end of the plant, by the Baltimore & Ohio Railroad. As will be seen, the plant is laid out primarily for delivery of hot metal to the mixer at the open-hearth building of the Trumbull Steel Co., and for the time being all raw materials are routed into the plant over the three-track reinforced concrete bridge, which also serves as the delivery track for hot metal to that company.

A new feature is to be found in the provision for screening of the coke at the furnace bins. This consists of two rotary grizzly screens, each having eight motor driven shafts. These shafts and the disks upon them are so spaced that the rotary grizzly removes material under ¾ in. in size. Flow of coke from the bin to the grizzly is controlled by a cut-off gate, and also by a rotary vane feeder. This provides a steady and even flow of coke over the grizzly.

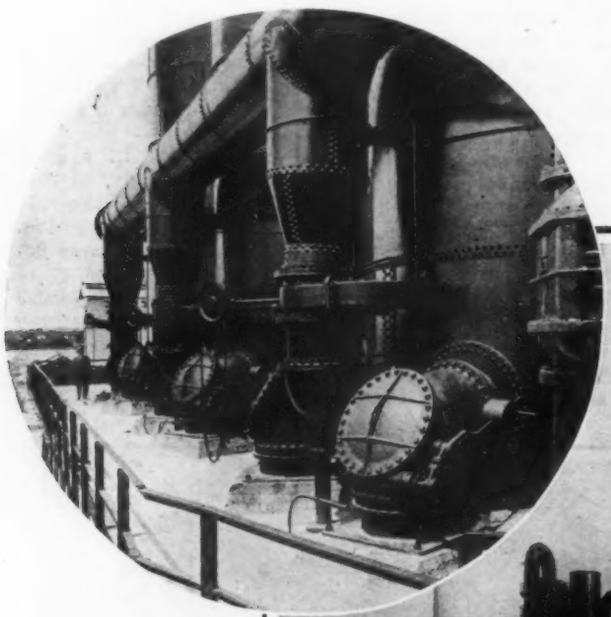
Emergency operation is provided for in a gate and a dead plate furnished over each grizzly, so that coke may be by-passed direct from the bin to the skip hoist bucket, in case the grizzly is out of operation. Underneath each grizzly is a hopper, one hopper delivering braize direct to a braize elevator, the other to an 18-in. belt conveyor discharging to the braize elevator boot. The elevator is a belt and bucket type delivering to a 24-hr. capacity bin. The motors driving the rotary grizzlies, the feeders and the belt conveyor and elevator are electrically interlocked, so that the

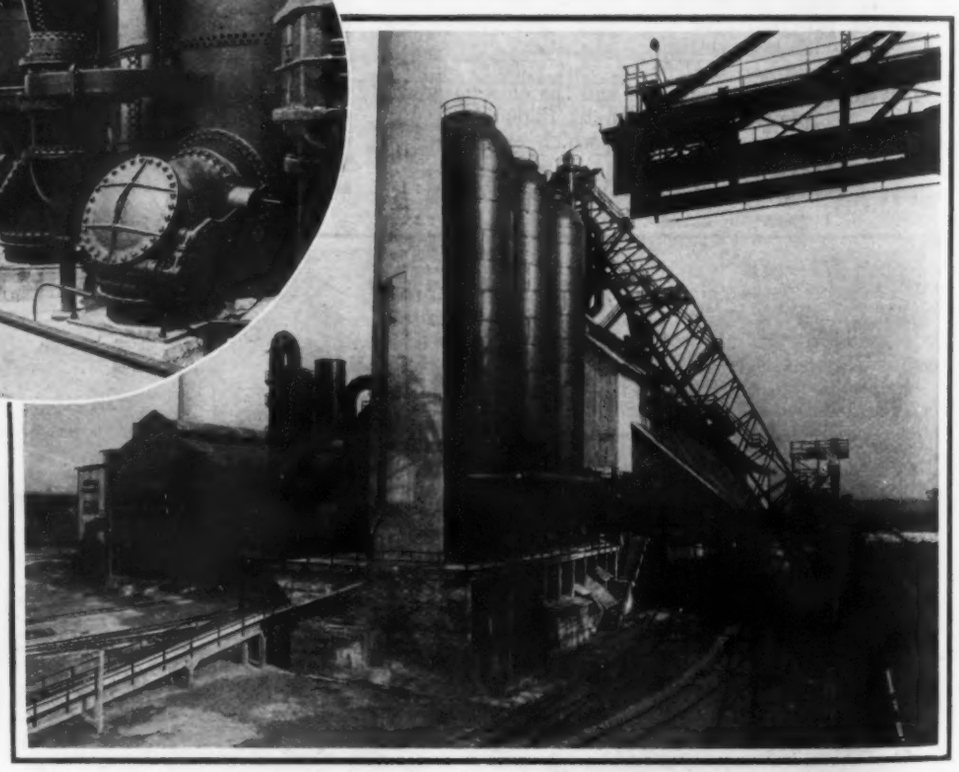
This View Shows the Compactness Which Is So Prominent a Feature of the Layout. The stack is as close to the stoves and to the gas-cleaning equipment as is permitted by considerations of ample working space. The passenger elevator and the blower's office and pyrometer house are conveniently located

motor driving the vane feeder and belt conveyor cannot be started until the motor driving the rotary grizzlies and the belt and bucket elevator is running. There is also provided a 20-per cent speed variation on the motors operating the rotary grizzlies.

The arrangement of cast house is the next outstanding feature. The cast house is 145 ft. long by 102 ft. wide, and has a 4-motor Cleveland Crane & Engineering Co. crane of 94-ft. 6-in. span, with 25-ton main hoist and 5-ton auxiliary hoist. This spans not only the cast house proper (70 ft. wide) from the foot up to the furnace front, but also spans two tracks, one the hot metal track and the other a track for spotting of cars, for removal of scrap and rubbish, and for unloading into cast house of coke braize, clay and sand.

This same crane is also utilized at the slag granulating pit at the foot of the cast house, and for this purpose is equipped with a Hayward 1½-cu. yd. bucket, having perforated bowl and manganese steel lips. The crane serves to unload from car or truck, and places upon the skip hoist house platform the motor armatures for the skip hoist or other material required. In the cast house is a brick and concrete structure providing storage for sand, clay and coke braize, in which there is also provided a mixing room for the preparation of these materials.





From the Ore Bins, at Right, to the Power House, Behind the Boiler House, at Left, the Layout Provides for Possible Future Expansion

In the Circle Is Shown the Special Valve Layout for the Hot Blast Stoves, Two Quick-Closing Chimney Valves Being Fitted to Each Stove

Convenient access is provided, not only by means of stairway but also by an easy incline up the stove foundation to the cast house floor. The grouping of a number of allied operations which must of necessity come under the eye of the blower at the furnace is very noteworthy at this point. The stove platform is at practically the same elevation as the cast house, the latter being reached by an incline not over 2 ft. in height from the stove platform. The stock bins are easily reached by a walkway from the cast house.

This walkway passes the skip hoist house, where the skip hoist, bell-operating cylinders, and distributing mechanism are placed, and also passes the skip incline. The blower foreman is thereby able not only to watch the work in the cast house and about the furnace, but also without going more than a few steps from the cast house, he can always check up on stove practice, or by watching the skip buckets, on the regularity of filling.

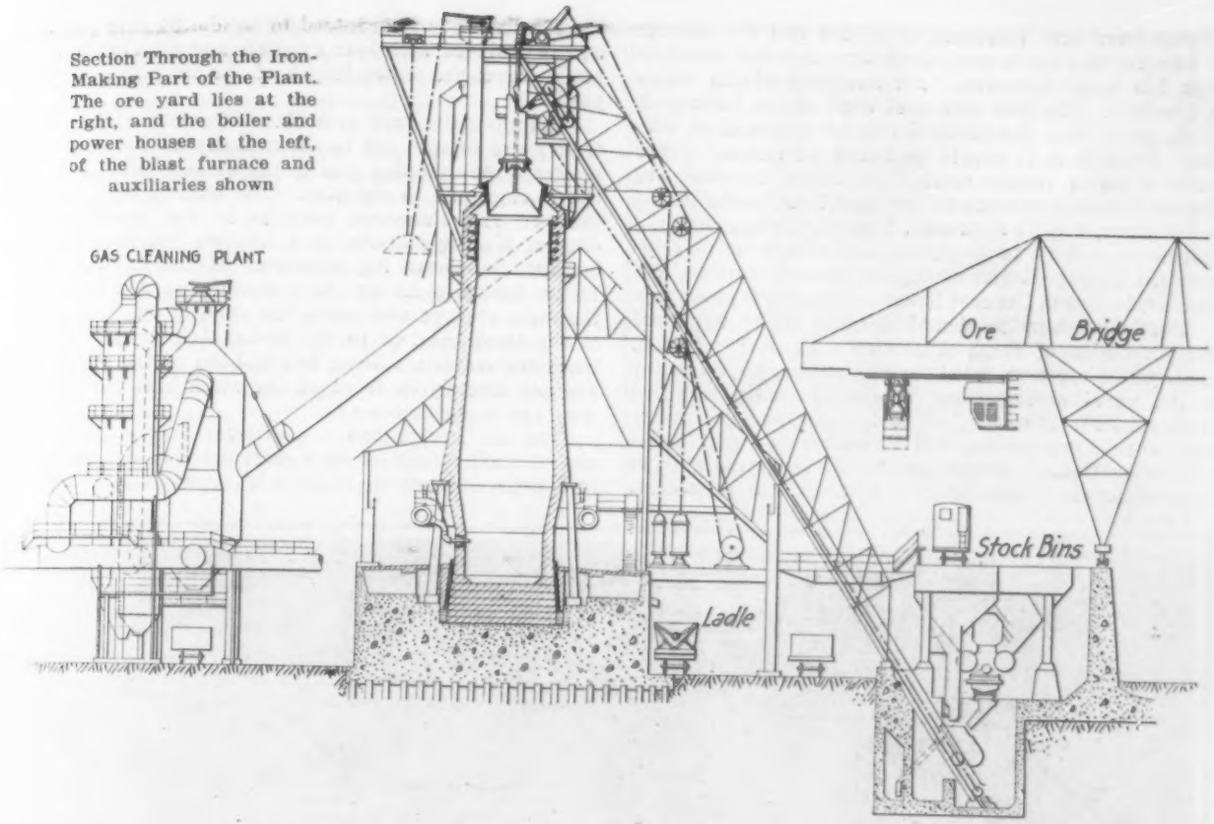
Provision is made so that the furnace can be rodded from the cast house, as a check upon the men in the stock house. The shutters in the iron runners are opened and closed by steam cylinders, these being operated from the central control station at the furnace front, where the snort valve wheel, the control for the Berg-Brosius mud gun and signal apparatus are located as one unit.

A new type of boiler setting places the boiler high, and gives an exceptionally large volumetric space per boiler hp. for complete combustion either of blast furnace gas or solid fuel. Four 14-in. Birkholz-Terbeck burners are installed at the back of each boiler. The combustion chamber for gas is under the mud drum, there being provided a distinct combustion chamber of large volume for the burning of the blast furnace gas without dilution by excess air through grate bars, or restriction of combustion by insufficient space, as in the usual setting.

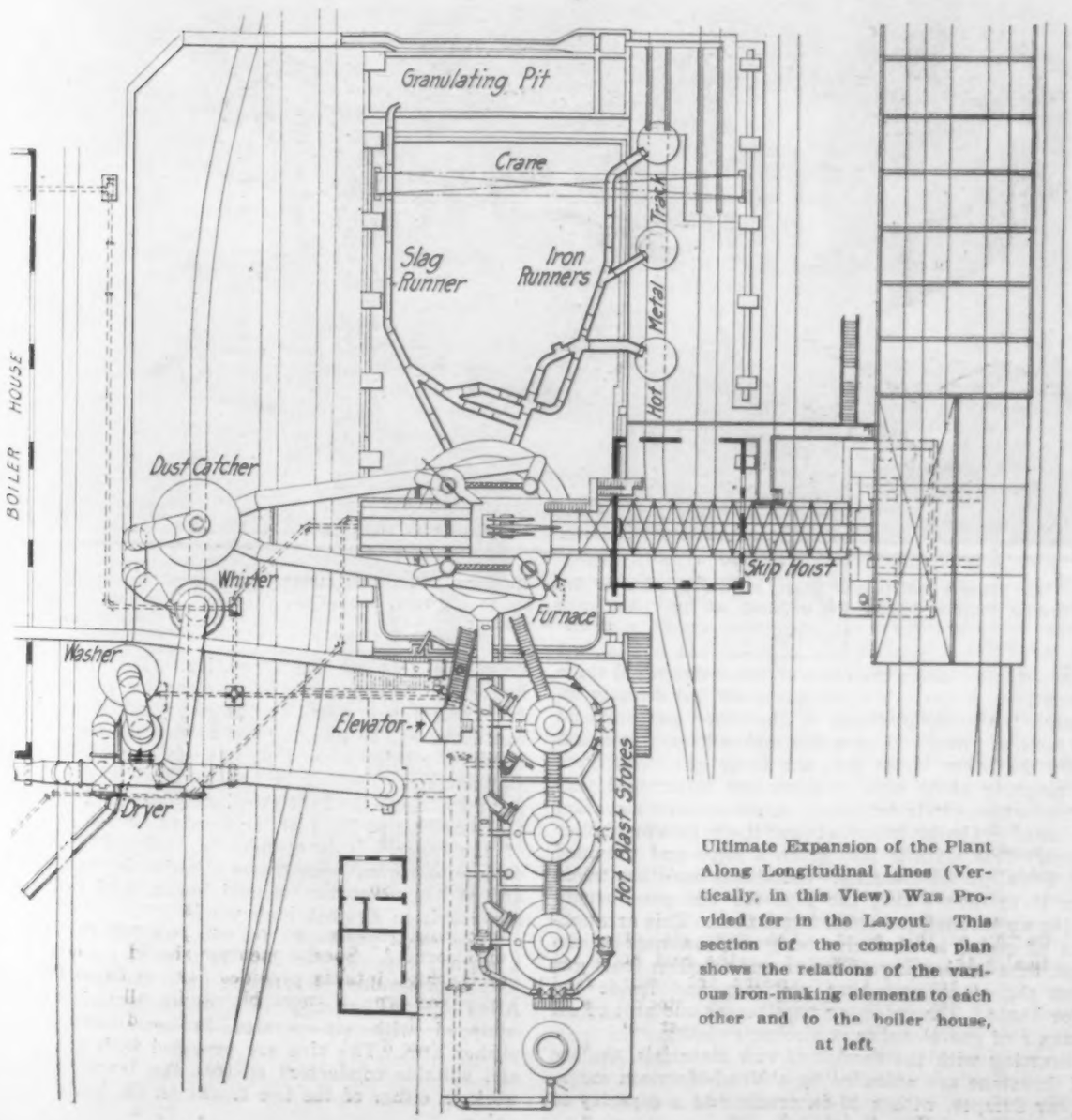
At the front of the boiler, grates are provided for auxiliary hand firing. The boiler is so designed that if increased power generation is desired stokers may be installed in place of the ordinary grates simply by building on a Dutch oven extension. The design has proved to have several very important advantages: it enables the boiler to be run at very high efficiency, due to complete combustion obtained in the large volumetric space; it enables considerable overload to be carried on the boiler, due to generation of high temperatures; it minimizes difficulties due to incrustation of tubes with dust or ash.

In the power house considerable advance in design is shown. Special attention has been paid to daylight lighting. Ample floor space is provided and all the successful features of modern power plant design are incorporated. Special mention should perhaps be made of the high intakes provided for the turbo blower, the advanced type of turbo blower installed, the completeness of the electrical equipment, and the well worked out system of water circulation and re-use.

In the blast furnace proper, the arrangement on the furnace top has been very materially improved as regards safety and convenience in work. The mantle and



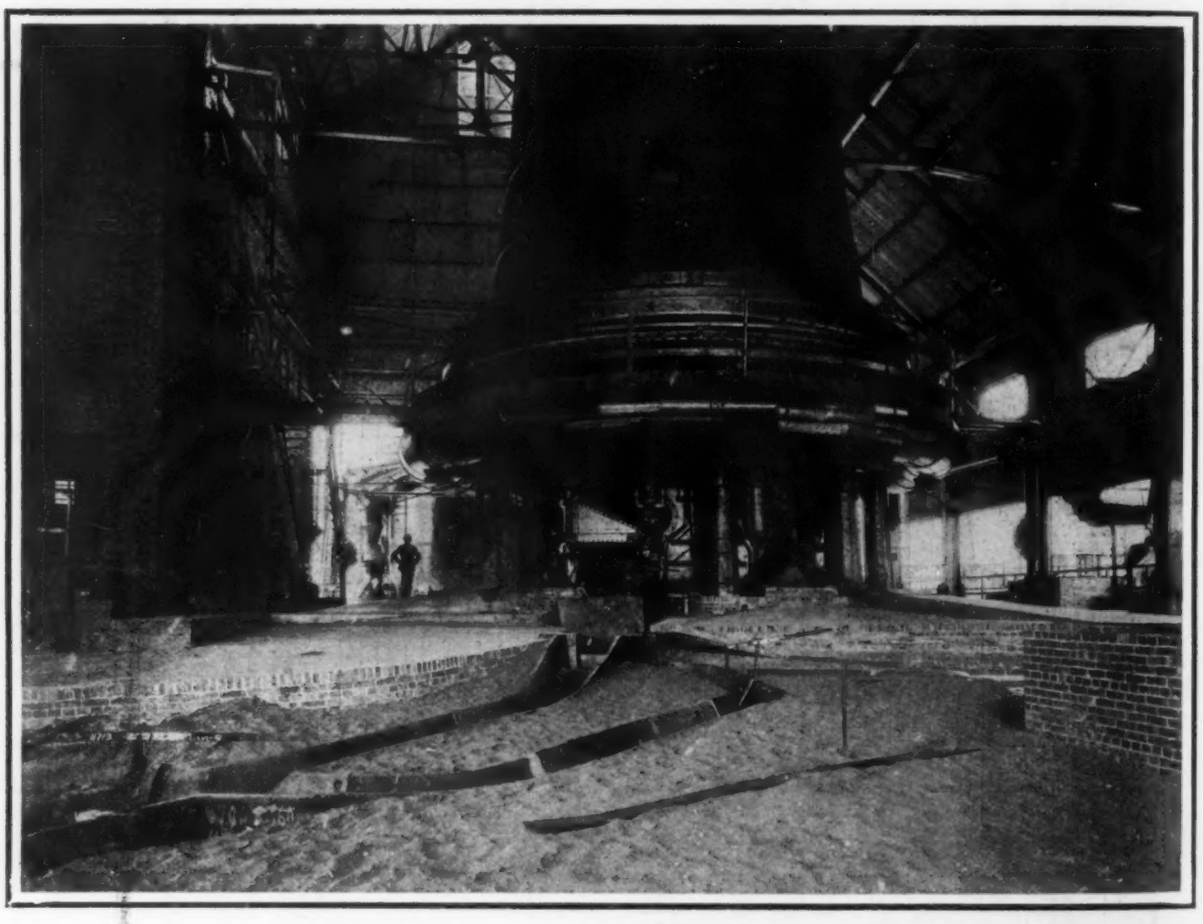
Section Through the Iron-Making Part of the Plant. The ore yard lies at the right, and the boiler and power houses at the left, of the blast furnace and auxiliaries shown



Ultimate Expansion of the Plant Along Longitudinal Lines (Vertically, in this View) Was Provided for in the Layout. This section of the complete plan shows the relations of the various iron-making elements to each other and to the boiler house, at left

column have been increased in section and the manner of hanging the circle pipe, discharge trough and bustle pipe has been improved. An auxiliary cinder notch is provided. The iron and steel work of the furnace is so designed that the furnace can be enlarged at succeeding blasts if it should be found advisable. Other matters which should receive particular mention are the evident care devoted to economy in concrete in the foundations, trestle approach, highway bridge and pig casting machine; and the new type of cantilever skip incline, which affords greater rigidity of construction, and increased room in the cast house and on the furnace top.

Particular mention should be made of the improved gas main system, which originated with D. T. Croxton, manager of pig iron sales for the company. Contrary to the usual arrangement, where gas mains are led overhead both at the boilers and stoves, the gas mains here are placed underneath or outside of the stoves and boiler house. At the stoves the large main from the gas-cleaning plant goes to a water seal separator,



In the Foreground Is the Start of the System of Iron Runners. The slag runner appears at right; the gas-cleaning plant is outside the building, at right; the stoves are in the rear, behind the furnace. The ample working space is evident

whence it is led along the piers of the skeletonized stove foundation. From this main, pipes are led directly up through the stove platform to the stove gas burners. The main is given a slope which makes it easy to clean.

On the boiler house side, the large gas main from the cleaning plant goes to a similar water seal separator, whence it is led along at about yard elevation outside of the boiler house between the engine and boiler houses. This main is also given a slope and provided with downlegs for cleaning. Individual leads are taken from it to each boiler, the pipe for the gas burners coming up through the boiler house floor. This arrangement of mains is conducive both to cleanliness of the plant, ease in cleaning of mains and freedom from gas about the stove operating platform and inside the boiler house. The grouping together as one unit of all elements of gas cleaning is also noteworthy.

Starting with the receipt of raw materials, the ore and limestone are unloaded by a Mead-Morrison movable car dumper, with a 57-ft. cradle and a capacity of 320,000 lb. It is guaranteed to handle 30 cars per hr., and is provided with both dynamic and air braking. It has a travel the entire length of the ore and limestone yard.

Spanning the yard is a Mead-Morrison 11-ton man trolley ore bridge. It has a capacity of 600 tons per hr. from the dumping pile to the storage pile, or from the storage pile to the bins. The method of handling the ore and limestone consists in the movable car dumper placing material in a concrete dumping trough beneath the shear leg cantilever of the bridge. The 11-ton bucket picks up the material and delivers it to the main storage pile under the span of the bridge, or to the stock bins, or to the 50-ton Atlas transfer car, when the materials being handled out of the stock pile are not directly in front of the stock bins into which they are being delivered.

The ore bridge has a cantilever at the shear leg end of such length as to permit delivery by the grab into railroad cars on the track, approximately 32 ft. from the foot of the shear leg. This permits ore buckets to be changed, and also enables the ore bridge to handle repair work at the car dumper. A similar cantilever at the pier leg end allows the ore bridge to handle the skips when they have to be replaced on the skip incline. The bridge has a travel speed of 70 ft. per minute and is of the skewing type, permitting either the shear leg or the pier leg to advance five deg. ahead of the other. It is completely equipped with safety devices to prevent over-travel of either leg or of trolley, and it has magnetic solenoid brakes and rail clamps for provision against high winds.

The stock yard, 270 ft. wide by 505 ft. long, has a storage capacity for 250,000 tons of ore and 80,000 tons of limestone. Operating upon the ore bins is an Atlas 50-ton capacity side dump electric ore car, equipped with air-operated brakes, doors and car pusher arm. The bins are provided with a cross-over and suitable conductors so that the transfer car can work on either of the two tracks on the bins.

Designed and installed by the Hoover & Mason Co., the ore bins consist of nine ore pockets with a capacity of 3120 cu. ft. each, four limestone pockets of 2900 cu. ft. each, and five coke pockets of 2900 cu. ft. each. In addition there is one central double compartment coke pocket, each compartment chuting coke to the skip bucket over a rotary grizzly screen. The rollers underneath the limestone pockets are perforated for screening.

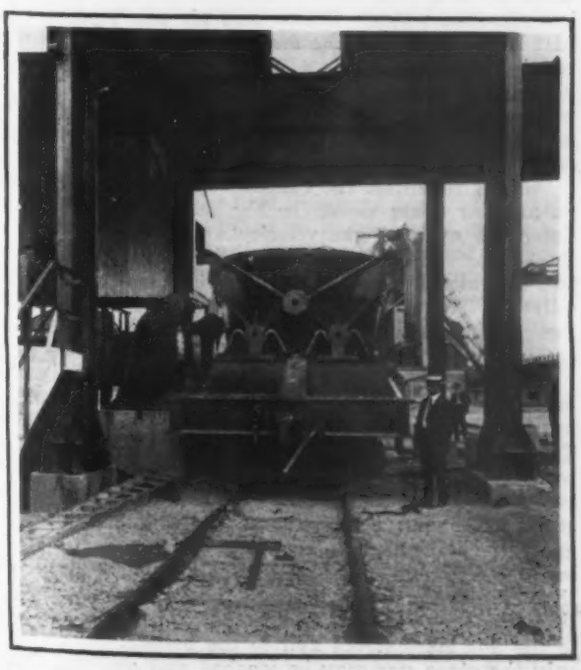
The scale cars are Hoover & Mason double compartment type, equipped with air brakes, air operated doors and dial indicating and recording scales. Turn-out tracks for the spare scale car are provided under one part of the reinforced concrete trestle approach, the other part of the approach being bricked in to afford housing for riggers' tools, blast furnace spares, etc.

To give the skip operator a view of the skip pit, as well as of the skip hoist track and the furnace top, the control station for the skip hoist is on the yard level in proximity to the skip incline. The same station houses the control for the bell-operating cylinders, the McKee distributor, the grizzly coke screens and the bell indicating and rodding devices. Connection is provided to the cast house and furnace top by speaking tubes.

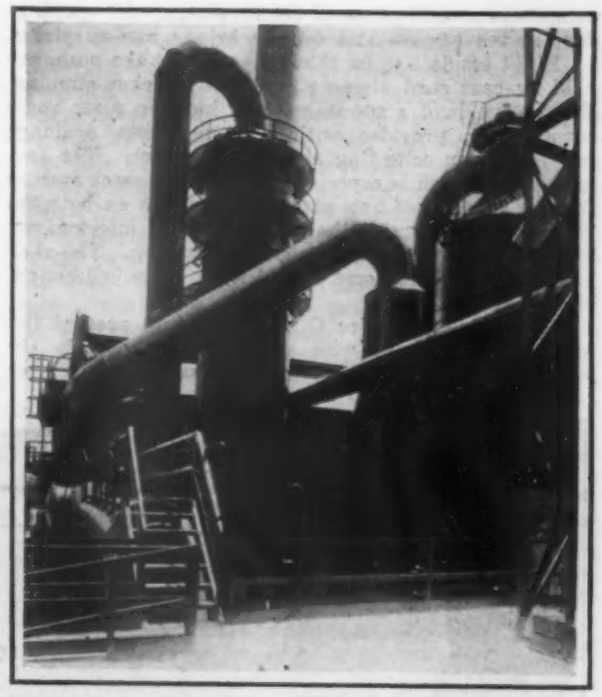
The skip incline is of the cantilever type, inclined 57 deg. from the horizontal. Its support is entirely independent of the blast furnace, so as to avoid any side thrust on the shell. It is 171 ft. 6 in. long, with double track for skip cars of the trailer truck type. Skips are operated by a Lidgerwood electric double drum hoist, driven by a single Westinghouse 200-hp. direct-current motor. The hoist has a rope speed of 300 ft. per minute and is designed for an unbalanced load capacity of 20,000 lb. Cutler-Hammer control is supplied.

This hoist is located in a concrete and brick house under the skip truss and above the tracks. This structure also houses the bell-operating cylinders, which are actuated by air from the cold blast main. An auxiliary air supply, provided from the high-pressure compressor line, is automatically admitted through a pressure regulating valve, in the event of drop in the blast line pressure. The control board for the McKee distributor is located in this house. This control is for six-station six-cycle operation, but provision is made for installation of additional panels for different cycles of charging.

The furnace top is of the standard double bell Freyn-Brassert design, having also a McKee distributor. The design of the receiving hopper and throat is worked out to give correct distribution, even when the charge is not revolved. The entire top of the furnace has solid plate guard rails, and special attention has been paid to accessibility of all working parts, and for observing both the distribution of material in receiving hopper and the dumping point of skip.



Pollock Short-Pour Hot Metal Ladles Are Used to Carry Iron from Furnace to Pig-Casting Machine (Here) and to Open-Hearth Mixer, Across the River



Gas Cleaning Plant, Viewed from Stove Platform. The whirler (center) is between the gas washer at left and the dust catcher, behind the corner of the elevator frame

Bleeders are provided with permanent rail platforms, as is also the outrigger. The outrigger has a trolley for facilitating work of repair or relining. Access to the furnace top is by interrupted flight stairs up the skip incline, and also by a bridge from the furnace top direct to the elevator, and by a bridge to the stove top. An extra large door is provided at the gas seal.

The six-passenger Otis elevator is a worm-geared traction type, having a capacity of 1500 lb. load, fully equipped with interlocking devices and emergency safety features. It has push-button control and four landings.

With a capacity of 25,500 cu ft., the furnace is 92 ft. high by 22 ft. 6 in. The iron and steel work includes a heavy continuous cast iron sub-base. The concrete foundation is reinforced by tension bands and the column base and columns are encircled by a reinforced concrete beam, extending between the columns up to within a short distance of the hearth jacket segments. There are ten cast iron columns, with ten tuyeres, placed centrally between columns, thus affording good working room. The columns are offset, which not only allows more room for work about the tuyeres, and places the columns and column base plates at a more remote location from possible breakout, but affords the possibility of enlarging the furnace hearth and bosh in the future. The columns are one piece and entirely free from any cast-on iron lugs.

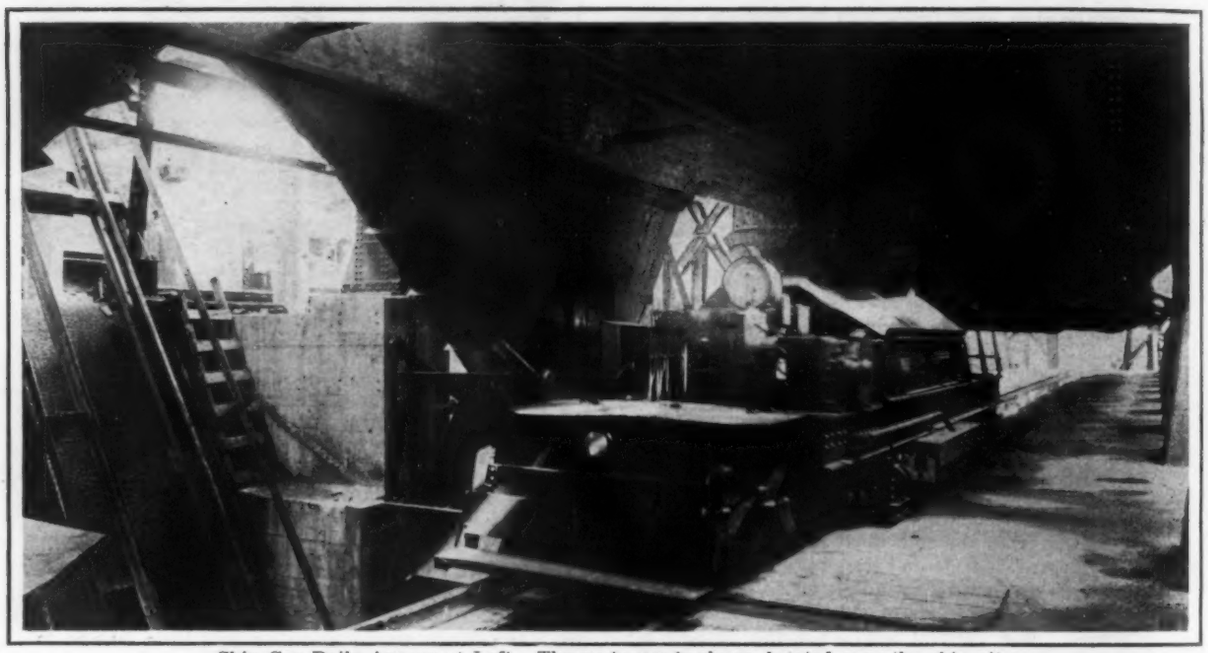
Bustle pipe, circle pipe and waste water trough are suspended from the mantle. The bustle pipe is insulated with Johns-Manville vitro fire felt, and easement against thrust against the columns, by expansion of the hot blast main, is provided in an expansion joint. Special attention has been given the location of circle pipe connections and waste water trough overflow, so that there is ample room on the bustle pipe walk, and it is free from obstructions.

The hearth jacket is of the standard Freyn-Brassert cast iron segment design, having cooling pipe cast in, and heavily wedge banded and bolted. It is tapered, thus maintaining a safe thickness of hearth wall against erosion and breakouts, and also maintaining ample brick at the bottom to prevent short holes and to prevent the hearth block from rising. The tuyere breast

consists of a solid armor of 1½-in. plates, with openings for the ten tuyeres and for the bronze cooling plates.

Eight bands, 1½ in. thick, reinforcing the bosh, are held by cast steel distance pieces to prevent slipping. The mantle is of a specially heavy built-up plate angle construction, provided with a trough with drainage provisions for collecting shell spray water. The furnace shell, which is especially designed to meet modern furnace lines, is of butt strap construction on both the two bottom rings and the top ring. The intermediate rings are of double lap riveted construction. The shell is surmounted by a dome on which the large bell hopper ring is riveted.

General Refractories Olive Hill steam pressed fire brick lining is fitted with a heavier thickness in the lower inwall, where maximum thickness is required, than in the upper part, where an excessive depth of lining would be detrimental. No interior water cooling is given the lining above the mantle, but a permanent pipe spray with connection is affixed to the shell. A platform at the spray is reached by a short bridge from the skip incline steps.



Skip Car Rails Appear at Left. The scale car is shown located over the skip pit

A new design of bosh and tuyere breast plate is used, having baffles that give positive circulation of water and enable the plate to be more easily withdrawn if cracked or burned. The hearth walls are cooled by the cast iron cooling pipe of the hearth jacket, which extend approximately 9 ft. below the tapping hole. The stock line is afforded protection by cast iron wearing plates of high combined carbon content. These plates, laid integral with the lining, are of small surface dimension in each unit.

Three hot blast stoves provide a total heating surface of 285,000 sq. ft. They are of the two-pass side combustion type, with a built-in draft flue in the skeletonized reinforced concrete foundation, this flue leading to a Heine reinforced concrete stack, 8 ft. diameter and 225 ft. high, brick lined throughout.

Each stove is equipped with blow-off valve turned down into the chimney flue, with quick closing chimney valves, gas burners and gate type hot blast valves. Provision is made for a future additional hot blast stove. These stoves have 3½-in. checkers with 2-in. checker walls, the design of checkers, arch and draft chamber equalizing the flow of gas down through the checkers, thus overcoming the usual tendency toward segregation of flow of gas in a limited number of checker openings.

All stoves are insulated with "sil-o-cel" powder and brick, and are lined with General Refractories fire brick; handmade inwall quality is used in the combustion chambers and dome, and steam pressed inwall quality in the top of the checkers. The ring wall and bottom of checkers, as well as draft chamber piers and arches, are made of stove quality. The gas main leading to the stoves has a butterfly valve which is intended later on to attach to a new design of gas pressure equalizing equipment to maintain constant pressure in the stove gas main.

The cast house is laid out to run cinder either to cinder ladles or to a cinder pit at the foot of the cast house. The iron runners are designed to deliver to three 75-ton Pollock short-pour hot metal ladles. They have a fall of ⅝ in. to the ft., to give a minimum amount of scrap. Coke dust, sand, loam, clay, furnace tools, copper, etc., are brought to the cast house by the 25-ton crane, and stored in a permanent brick and concrete shed inside of the cast house.

The working cinder notch is 45 deg. from the iron notch. An auxiliary cinder notch is provided, fitted up with a standard cooler and intermediate cooler, so that cinder can be withdrawn here in an emergency. The shutters are all of the Fraser remote control type, and the snort valve wheel, mud gun control and shutter control are all located at one point.

Special lighting facilities have been provided and there are abundant hose connections for both high and low-pressure water. Steam and air are piped to the cast house for use on the mud gun and for other casual requirements. There is a speaking tube from the cast house to the nearby operator's house, and to the furnace top, and there is also a duplex signal apparatus connecting the cast house with the boiler house and power house.

Gas is taken off the furnace by four offtakes from an annular space about the big bell hopper, which reduces the average gas velocity and the production of flue dust. These four offtakes lead to four uptakes, two of which are surmounted by Baer safety explosion valves. The uptakes lead into four downtakes, each two combining into one downcomer. The two downcomers enter the dust catcher radially.

The gas cleaning system is located between the boiler house and the blast furnace. There is one 22-ft. by 40-ft. dust catcher for primary cleaning of gas. The gas is then led to a 12-ft. 6-in. Brassert tangential whirler, where further amounts of fine flue dust are removed. From the whirler the gas is led through a series of goggle valve by-passes, so arranged that the gas can be handled in a variety of ways. It is contemplated to run—and the system is thus arranged—so that all the gas is led through the gas washer, thence through a water seal separator to the main leading to the hot blast stoves and to the boilers. If desired, only the stove gas may be washed and gas sent from the whirler direct to the boilers, or in an emergency rough gas may be sent to both stoves and boilers.

All these gas cleaning elements are located in one unit, completely equipped with platforms, thus making easy their supervision and care. The system includes standard equipment already used on upward of ninety installations, embodying well worked out means for obtaining gas with not to exceed 0.2 grain of dust per cu. ft. The washer has a novel arrangement of sprays which produces a large mass of spray having an intense whirling action. Not only is there an appreciable economy effected in the use of water, but the washer handles and cleans dirty gas even better than heretofore.

To eliminate the nuisance of dust, which has always been such an annoyance at blast furnace plants when the dust catchers are dumped, Mr. Croxton has evolved an arrangement which will deliver the dust from the dust catcher and whirler to the cars in a moist state. This consists of a Bartlett-Snow double screw inclosed conveyor attached to the dust catcher by a special screening casting. Dust flows through this screen and falls into the first stage of the double screw conveyor, which conveys it down into an inclosed trough of water and delivers it to the second screw conveyor, which again lifts the dust out of the inclosed trough and delivers it to the car. The dust, in passing through the double screws submerged in the trough of water, becomes thoroughly pugged and saturated with moisture. The coarse materials that do not pass the screen leading to the pug mill go to the bottom of the dust catcher, where they are removed by occasional dumping of the main dust catcher bell. In an emergency, the entire contents of the dust catcher may be removed in the usual way.

Branches from the gas cleaning plant carry the gas main system to both the stove and boiler gas mains. At both the stoves and boilers water seals are provided; in addition, a further complement of water seals is installed, so that the stoves or boilers may combinedly be cut off from the entire gas cleaning system at cast or shut down, so that the wet cleaning system may be isolated from the dry cleaning system, and so that the entire system can be isolated from the furnace. These water seals are provided with large capacity lines, so that water can be admitted and the seals filled in a very short time.

The blast main system starts at the turbo blowers, the discharge from which has an Ingersoll-Rand multiple-port disk check valve. Motor-operated cold blast valves are provided outside of the power house building. The cold blast main leads directly to the hot blast stoves, being provided with two counterweighted blast relief valves and the usual snort valve, the discharge of which is turned down into the stove flue. The bypass leaves the cold blast main at its end and leads around No. 3 stove, entering the hot blast main at the extreme end from the furnace. It is provided with a McCarthy check and regulating valve.

Hot metal is normally shipped to the mixer of the Trumbull Steel Co., but there is also provided, for the casting of chill iron, a double strand pig casting machine. This is standard Heyl & Patterson equipment, having manganese-steel links and pins. The pig machine strands are mounted on a reinforced concrete structure. This type of construction, originated at the blast furnace plant of the Otis Steel Co., was chosen because of elimination of deterioration encountered with structural steel supports, by reason of the large amounts of steam and water about the operation. The concrete structure provides a continuous platform under the strands, makes for easy replacement of molds, and provides a channel for spray water, which is carried into a sump at the pouring end. The length of rails is limited to 11 ft., to make convenient handling when replacements are necessary. All castings used in the machine and structure can be replaced by open sand castings poured at the cast house of the plant. The machine is laid out for additional strands, with the growth of the plant.

Integral with the pig casting machine is a combined ladle and pouring house. In this is a 55-ton Morgan pouring and ladle handling crane having 100 per cent overload capacity. This serves both to pour the ladles by means of the patented Pollock short pour device, shown in one illustration, and also to remove the ladles from the trucks for relining. A spare ladle is provided, to be held in reserve for lining.

After considerable study the track scales were so located that they serve admirably both for the light and heavy weighing of pig iron cars, as well as for check weights on receipt of raw material into the yard. In the scale house are also incorporated the yard master's office, locker rooms for train crews and washroom facilities. A larger locker and service room for the furnace men is located in proximity to the incline leading from yard level up to the furnace and stove foundation top. Additional toilet and locker rooms are located in the basement of the power house and boiler house, and at the machine shop.

Material quantities used in connection with this job are of interest. There were placed 2246 Raymond reinforced concrete piles, 20 to 30 ft. long; a total of 61,974 cu. yd. of excavation; 31,601 cu. yd. of concrete; 224,365 cu. yd. of fill; 750 tons of reinforcing steel; 1270 tons of plate; 729 tons of castings; 145 tons of structural shapes; 65 tons of forgings; 1251 tons of structural steel in buildings; 1,020,000 building brick; 2,083,000 fire brick, and an average of 371 men were employed per day for the ten months' construction period.

Fabrication and erection of structural steel in buildings and skip incline were done by the Lackawanna Bridge Co.; the Hill Clutch Co., Phoenix Iron Works and the Pennsylvania Engineering Works furnished some of the iron and steel castings. Fabrication and erection of iron and steel work other than structural were done by the William B. Pollock Co. All brick work in furnace, stoves, boilers, power house and offices was placed by the P. J. Brown Construction Co.; the concrete was put in by Arthur G. McKee & Co. Piping was installed by B. Floersheim & Co. Instruments for the blast furnace and power and boiler houses were supplied by the Bristol Co.; pipe covering by the Keasbey & Mattison Co.

Plans and specifications for the complete plant and plant equipment were drawn up by Freyn, Brassert & Co., Chicago. These engineers also had supervision of construction.

New Wire Products Company in Worcester

A new corporation known as the G. F. Wright Steel & Wire Co. has been organized at Worcester, Mass., headed by George F. Wright, son of George M. Wright, former president of the Wright Wire Co., and it has purchased the plant of the Standard Plunger Elevator Co. at Jamesville, a suburb of Worcester. The new company will manufacture wire rope, wire cloth, wire lathing and poultry netting. Some of the special machinery has already been constructed, and it is planned to begin manufacturing at an early date.

The company will be incorporated with a Massachusetts charter and capital stock of $100,000. George F. Wright will be president and general manager, A. B. Peavy vice-president and general sales manager, and Herbert N. Wright, former treasurer of the Wright Wire Co., and one of the founders of that business, will be treasurer and clerk of the company. Another director will be Albert S. Knapp, who was in charge of one of the weaving departments of the Wright Wire Co., and has specialized as a mechanical engineer in the designing of wire machinery.

George F. Wright, head of the business, has been connected with the wire industry for 10 years, learning the business in a practical way in the mills at Worcester and Palmer, Mass. He became assistant general manager of the Wright Wire Co., and continued in this office under the management of the Clinton-Wright Co., and when the larger Wickwire-Spencer Steel Corporation took over the business was made a director and a member and the clerk of the operating committee.

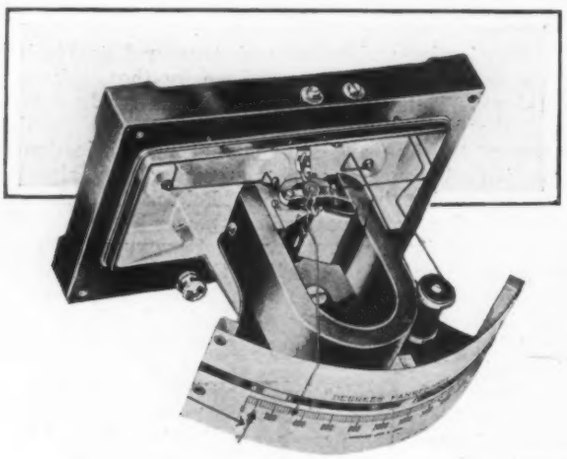
The Standard plunger plant consists of 5½ acres of land, with a main building 150 x 300 ft., one story with monitor roof, and served by a 10-ton electric traveling crane. It is on the Boston & Albany Railroad, with which it is connected by a spur track. It will lend itself readily to its new use. The Standard Plunger Co. recently went out of business.

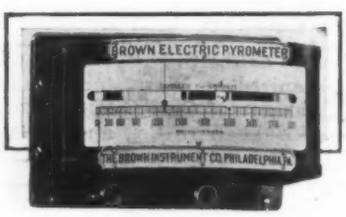
Cold Junction Compensated Pyrometer

The Brown Instrument Co., Philadelphia, is placing on the market a new thermo-electric pyrometer which is automatically compensated in the instrument for changes in cold junction temperatures. A means of setting the pointer of the instrument to zero in the usual manner is included.

It is generally known that the millivoltage developed by a thermo-couple is dependent on the difference in temperature between the hot and cold ends of the thermo-couple. To secure accurate measurements therefore, it is necessary that the cold end be maintained at a constant temperature or that the instrument be compensated for the changes in temperature at the cold junction of the thermo-couple.

It is common practice to use extension or compensating leads to transfer the cold junction from the binding posts of the thermo-couple to a distant point, locating the cold junction at the end of the leads in a cold well in the ground or in a compensating box, where the temperature can be maintained constant. In the pyrometer under consideration the extension or compensating leads are brought to the meter, changes in temperature at the end of the leads also taking place in the meter itself, which can be compensated for the change in temperature. To secure this compensation a Briguet spiral, similar to that used by Darling in England in 1909, is mounted in the instrument, controlling the springs and moving element directly. A second index controlled by thermostatic metal is mounted on the scale and works with change in temperature exactly in relation to the movement of the pointer controlled by the Briguet spiral attached to the moving element.





A Briguet Spiral Is Used for Automatic Cold Junction Compensation. The spiral also controls index for zero setting

In using the pyrometer the pointer is set by the zero adjustor to correspond with the index on the scale. If, for instance, the values for a thermo-couple are based on a cold junction of 75 deg. Fahr., the index will indicate 75 deg. provided the instrument is subject to this surrounding temperature. If the pointer does not correspond with this index, it is set accordingly. When the temperature around the instrument and the cold junction of the end of the compensating leads rises to 90 deg Fahr., the index automatically rises to 90 deg. and the Briguet spiral attached to the instrument pointer causes it to move up to 90 deg., automatically adjusting for the temperature of the cold junction of the thermo-couple.

Any number of thermo-couples with their extension or compensating leads can be brought to one instrument. Recording instruments can also be equipped with the automatic compensation and means for setting the point to zero.

Rubber-Tired Steam Shovel

The Osgood Co., Marion, Ohio, has completed the development of an 18¾-yd. traction revolving steam shovel equipped with solid rubber tires. It is designed especially for use of contractors having jobs that require frequent moves over paved streets or highways. For traveling under its own steam the shovel is provided with a 2-speed gear arrangement by means of which a speed of 3½ miles per hour can be obtained. A means for disengaging the traveling gears for towing has also been provided. Steering is accomplished by swinging the upper body slightly to the right or left. The tires are 40 x 14 in., ribbed-thread mounted on steel rims. They are pressed on the regular 34 x 16 in. cast steel wheels, an arrangement intended to permit the removal of the tires when desired, and by attaching cleats to the rear wheels rendering the shovel ready for service without the rubber tires.

Union Refusal of Coal Wage Modification

Attempts to interest the United Mine Workers of America in the necessity of a modification in the wage agreement in union fields so that operators in those fields can compete with non-union mines are meeting no success. The advisory board of the Northern West Virginia Coal Operator's Association held a conference with John L. Lewis, president of the United Mine Workers in Indianapolis, Sept. 7. The operators explained to Mr. Lewis that by reason of the wage reductions in the non-union fields surrounding northern West Virginia, any of the freight differentials, this region is at a great disadvantage in competition with other fields at the present wage scale. They asked for a reduction in the scale. Mr. Lewis told the operators' representatives that this is an inopportune time to make any reductions in wages; that every unionized mining district has similar arguments and to grant a reduction in northern West Virginia would disrupt the entire mining industry at this time.

Carnegie Veteran Association in Pittsburgh

Formal organization of a veteran employees' association in the city offices of the Carnegie Steel Co., Pittsburgh, was accomplished recently. The title of the organization is the Carnegie Steel General Office Veteran Association, and it is composed of those who have been in the company's service for 20 or more consecutive years. The organization starts out with 175 members, 10 of whom are women. Officers are: Honorary president, Homer D. Williams; president, L. R. Burnett; vcie-presidents, W. W. Blackburn, Thomas Woods, Charles Orchard, John Longabaugh and John O. Leech; treasurer, Howard E. Jeffries; secretary, H. A. Beltz; trustees, J. B. McKillips, H. J. Baer, Anna M. Enright, J. M. Camp and John W. Brandon.

Less Unemployment in Buffalo

BUFFALO, Sept. 12.—Survey of the unemployment situation in Buffalo by officials of the New York State Employment Department, show a material increase in the number of workers who have taken jobs in August and to date in September. The investigation shows about 37,000 workers are now unemployed—a decrease of 2600 from June. Many of these were absorbed by steel interests which increased operation within the past thirty days.

A new application of liquid oxygen, the use of the material in mine rescue breathing apparatus, is being investigated for the United States Bureau of Mines by Dr. F. G. Cottrell, of the National Research Council, formerly director of the Bureau of Mines.

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The Wire Advance

The advance in the price of wire products, put into effect on Sept. 10 by the leading producer, and later by its competitors, coming when all other steel products were tending downward, arrests attention and calls for comment. The advance was made after buyers of wire nails and of all the various forms of wire had been told it was impending, and had been given opportunity to buy for two months or more ahead at the prices recently prevailing, based on $2.50 for plain wire and $2.75 for wire nails.

The first reaction to the announcement of a purpose to put up wire was no doubt a question as to the ability of any producer to cause a turn in the market under existing conditions. The pressure from buyers of steel in all lines was for lower prices, regardless of the fact that practically all steel companies have been operating at a loss, and that the steel trade, considering that labor and especially transportation are well above the levels of 1914, has gone further in readjustment than have the manufacturers of commodities entering largely into the cost of living. But the general thinking in the trade apparently had not taken in one important feature of the situation in wire, which was that in the two months since the $2.50 and $2.75 bases for wire and wire nails had been adopted there had been but little departure from those prices. In other words, no producer of wire had made a serious effort to increase his proportion of the going business and his rate of operations by further cutting of prices. With the market stationary—due to the fact, of which the wire companies were painfully aware, that in relation to cost wire products were the lowest on the list—the proposal to make a moderate advance had a foundation of good salesmanship as well as of good psychology.

The time-honored procedure of accepting orders at the prevailing level, pending an advance, was followed in the present instance, and the result was the booking in ten days' time of a larger volume of orders for wire and nails than had been taken over many weeks just preceding. The move disclosed a meagerness of stocks—in warehouses and at the plants of manufacturing buyers of wire—that has probably not been duplicated in the history of the trade. Buyers, sharing the general expectation that regardless of costs all steel products were headed for an indefinite decline, were working on barely more than week-to-week supplies from the mills.

Coming in connection with the recent advances in grain and cotton and the upward turn in pig iron, this effort of the wire manufacturers to get back their cost and to check the long and discouraging decline, will emphasize some possibilities in the situation that should not be overlooked. On a 20 to 25 per cent operation, steel works were plainly dropping below the actual rate of consumption. While rebounds do not mean entering upon a steady up-grade movement, they have always played their part in the preparations for that movement, and therefore have a significance that is not to be minimized.

The consumption of wire has so many ramifications both in manufacture and in the everyday buying of the people that the episode of the past week will have a wide influence. There is the suggestion also that in one or two other products, particularly sheets, in which the declines have been marked, the possibility exists of a similar upturn, even though in general the readjustment of iron and steel values may not have been completed, granting lower freight rates and further economies in labor cost.

Stages in Readjustment

The readjustment in business and industry that became necessary when the discovery was made that things could not continue as they were in the fore part of 1920 is a readjustment that must go by stages. One stage, that of price deflation, is nearly if not quite accomplished for the time being, but other developments must occur. It has become perfectly plain in recent months that business did not stop simply for a price readjustment. The "strike of buyers" was not merely for such lower prices as would induce a resumption of buying on a scale giving business the same appearance of activity as obtained during a large part of last year.

As to price readjustment, the index numbers have been practically stationary of late. In some districts retail prices for food have increased slightly. The cost of living, in general, is not declining notably, though rents are in line for further reductions. As to steel prices, THE IRON AGE index number shows finished steel prices to be about 35 per cent above their ten-year average before the war, which, with iron and steel works wages at more than 50 per cent advance over 1914, freight rates up 75 to 100 per cent and other fundamental items of cost high, represents substantially all the liquidation that can be expected since prices relative to cost are much lower than before the war.

The volume of business now being done in the United States is really very large in the aggregate, possibly larger than a year ago. It is certainly larger in some lines. A curious thing is that while the increased efficiency of labor is universally recognized, many men do not follow the point to its logical conclusion, that for everyone to be employed there must be more work to do, in other words, a greater demand for commodities and services than there was in 1920.

In this matter of changes in prices and in the volume of work done we are having since the armistice on a large scale what before the war we used to have periodically on a small scale. The principle is much the same. Before the war prices would get too high and business would slacken. When the cost of commodities and services got down sufficiently, demand would be created that did not exist at the higher prices and thus the slack would eventually be taken up.

The second stage in any of these readjustments is that of new classes of demand developing, the first stage having brought about deflation in prices for services and commodities. It is at this point that a difficulty arises. Before the war business in general had certain classes of demand to fall back upon. In particular, there were new railroads, skyscrapers and factories required. At the present time these outlets for our surplus potential activity do not exist to the same extent. In railroading, the objective is not so much as formerly an increase in the physical equipment as it is the attainment of greater efficiency in the employment of the facilities. Some skyscrapers are needed, and here and there some are being built or are projected, but we are not going to go in for skyscrapers on an enlarged scale. As to factories, there are some manufacturing lines in which there are too many factories, due to the war.

All this simply means that we are going to adopt new lines of activity, it being quite certain that we are resourceful and ingenious enough to find employment eventually for the unemployed. Every one cannot go back to his old job, for many were receiving wages without doing the corresponding amount of work. Just what the new lines of activity will be cannot be predicted definitely, but they can be found and must be found. We can have overproduction of specific commodities and overdevelopment of specific facilities, but we cannot have overproduction as a whole, for some new thing can be made that people will buy, or some new facility created that people will patronize. Eventually that will be the solution of unemployment. Everybody says we must work harder and be more efficient, and if we do that we are entitled to have more conveniences and luxuries. To get these things and at the same time to provide employment for every one, we must branch out into new lines of production and consumption.

Electric Furnaces for Heat Treatment

The already extensive use of electricity in the heat treatment of steel and non-ferrous products in American plants appears from a review given on other pages of this issue. This new development takes its rank alongside of the employment of electric furnaces in making steel and in melting non-ferrous metals and alloys, in which the United States is the acknowledged leader. In this newer field it is probable also that no other country can show that it now has at least 80 furnaces of various types employed in the heat treatment of steel alone, with nearly a half dozen on non-ferrous products. Already five American electric heat-treatment furnaces are credited to foreign countries.

Among the many products now heat treated electrically, gray iron castings are listed alongside of steel castings; also automobile and aircraft parts, sheets, bolts and nuts and various other steel products. The application to non-ferrous materials is greater than was generally believed and it would appear that this phase of heat treatment is only in its beginnings. Also the use of electricity in the enameling and glass industries is quite extensive. The size and types of furnaces, many of them automatic, are a testimonial to the inventive ability of American electrical engineers. Equally noteworthy is the development of the pyrometric devices which are so vital an adjunct to this industry.

Emphasis on the growth of electrical heat treatment is not intended to throw into the background the extensive application of oil and other fuels to heat-treating operations. Some notable achievements are reported of oil-fired annealers and heat-treating furnaces for steel and other materials. Gas, oil and coal have been used for these purposes for many years. However, the war, and particularly the demand of the ordnance departments of the Government for a quick and closely regulated and efficient source of heat, have been the prime causes of the rapid development in electric lines. Twenty-two electric furnaces of one type were in use during the war on the heat treatment of guns.

There is room for all systems and they will all develop as the demands of industry grow, for the trend is towards more exact results and more exacting materials.

It has been reported in the copper trade recently that Germany is not only the heaviest foreign buyer of copper, but that her purchases have been exceeding those of any other two countries. Official statistics of the exports for the first seven months of this year, just issued, confirm this statement. For the period mentioned Germany has taken 127,632,400 pounds of copper, as against

109,666,200 pounds as the combined exports to France and Great Britain. Germany's purchases are not only twice what they were for the same period in 1920, but they constitute nearly 40.5 per cent of the total exports. Germany is now buying more copper than in 1913, when preparing for war, her purchases then being 33 per cent of the total sold by the United States for foreign consumption.

Increased Steel Production

The 30 steel companies which make monthly reports to the American Iron and Steel Institute of their ingot production made 803,376 tons in July and 1,138,071 tons in August. The months had 25 and 27 working days respectively, so that if the rate of production had not changed the August report would have shown 867,646 tons, while the tonnage actually reported is 31 per cent greater. Plainly that is a remarkable percentage increase for a single month, a fact that is well brought out by the observation that if such a gain were compounded for about six months it would produce a full operation. Since nothing of that sort can be expected the August increase must be viewed as being in part simply a recovery from a particularly low rate.

The 1920 output of the 30 companies that report monthly was 84.2 per cent of the total steel ingot output of the year. The producers who furnished the other 15.8 per cent always provide an element of doubt in considering the monthly reports, for the reason that their operations may not be at the same ratio as obtained in 1920. Assuming that the ratio held good in August, the production of steel ingots by the entire industry was at the rate of about 15,600,000 gross tons per annum, or at the rate of about 30 per cent of capacity, the favorite estimate of actual capacity at the present time being about 52,500,000 tons.

Production in July was at little more than 20 per cent of capacity, regarding the month as a whole, but there was a time in the month when it was particularly light, and probably ran below 20 per cent. No one could assume for a moment that such a low rate could obtain for any length of time. The country is still doing business, and is really doing a fairly large business, but it has been liquidating stocks and it has been doing a smaller amount of construction work, in relation to the stage of general business activity, than is usual. Thus, even with no material improvement in the general tide of business, the quantity of steel production could be expected to increase.

As a matter of fact, that apparently is what occurred in August. The demand upon the steel mills had been in subnormal relation to the amount of steel that was actually being consumed or put into use in ultimate destinations. A dictum that had general acceptance before the war has frequently been recalled in recent months, that dictum having been that the rate of steel production could not go below about 50 per cent of capacity. The dictum rested both upon theory and upon the actual showing, for at no time in the history of the steel industry, until after the inception of the world war, and then for only a very short time, did the American steel industry operate at less than about 50 per cent of capacity.

An interesting question has arisen, whether the increase in productive capacity was responsible for the low percentage rate of operation in recent months. The increase, from 1914, may be taken at approximately 50 per cent. From one viewpoint this increase could not account for operating rates under 33 per cent, for 33 per cent with present capacity is equal to 50 per cent with the pre-war capacity. The matter might be looked at from another angle, possibly. If there had not been the increased capacity last year production would not have been as great, and perhaps some demand would have held over. Everyone knows, at any rate, that if steel consumers and distributers had all realized last fall and winter just what was coming, the stocks of steel that have stood in the way of steel operation in the past few months would not have been accumulated. The stocks are not entirely liquidated yet, so that steel production can increase further merely to get in normal relation with the general volume of work that is being done in the country.

CORRESPONDENCE

Effect of Seasonal Production on Building

To the Editor: The summary of the report of the Committee on Elimination of Waste in Industry in your issue of Aug. 11 makes very interesting reading. In the winter of 1919-20 we put up a small plant, and for a long time will remember many causes of delay and extra expense besides the inclement weather which prevailed.

It is gratifying to note that while the committee does not hesitate to place a large share of the responsibility for waste in building operations on the unions, it is fully alive to lack of efficiency on the part of the contractor and to the fact that there were acts of collusion between workers and contractors, the public at all times paying the piper.

It is evident from the statistics given that there could be much more work for the men in this line, as only one half of the idle time is due to weather conditions. A number of plants had to be expanded and office buildings constructed after our entry into the war and subsequent thereto. Notwithstanding the high costs, it was possible to secure some kind of a return on these investments; but dwellings, either single houses or apartments, showed almost no increase during the same period. It may be assumed that this phase of the situation was responsible for the days of idleness.

Real estate owners could not build at a price that permitted of a rent within reason. For the same reason the individual could not afford to build a home, knowing that to do so meant eventually decreased instead of increased value. In this latter class are many workmen in industrial plants throughout the country, besides many in the various building trades themselves. Even if building costs do come down to an appreciable extent many who desire to own their homes will have to forego ownership seeing that it is closely linked with seasonal production in many lines. There has been more or less agitation of this question but no real forward movement has developed. The fact is that a goodly number of our clerks and skilled workmen should take advantage of building and loan associations or other organizations formed to finance home building were they relieved of the fear of having to seek employment elsewhere because of regular or un-

certain periods of shut downs. Proper study and some education of the public in buying might eventually eliminate a large part of the seasonal periods of non-production or at any rate establish a better average of plant operation.

If the workmen in the building trades were assured of work the year round, save when debarred by weather conditions, perhaps they would in time see the advantage of such a condition with a reasonable daily wage, as contrasted with an extremely high rate of pay but at the same time many days of unemployment.

H. D. MURPHY.

Medford Hillside, Mass.,
Aug. 27, 1921.

Embrittling Effect of Pickling Upon Carbon Steel

To the Editor: On page 334 of THE IRON AGE, Aug. 11, appears a paper entitled "Embrittling Effect of Pickling upon Carbon Steel," which should prove of value to anyone interested in the microscope and its uses in metallurgy. It is not as a piece of research work, however, that it has its greatest value, but rather as an example of the false conclusions and erroneous impressions which can be drawn from metallographic work of inferior quality.

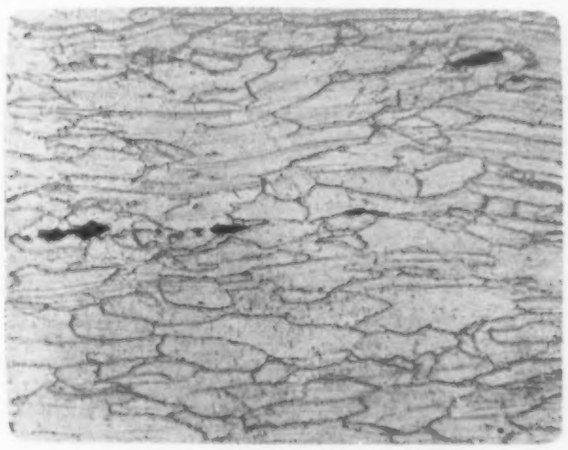

Fig. 1.—Photomicrograph of Section of Black Sheet Etched for 10 Sec. with Nitric Acid and Magnified 200 Diameters

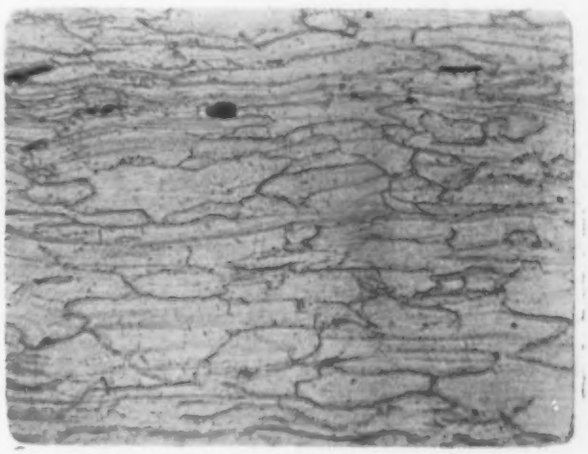

Fig. 2.—Photomicrograph of Pickled Sheet Etched for 10 Sec. with Nitric Acid and Magnified 200 Diameters

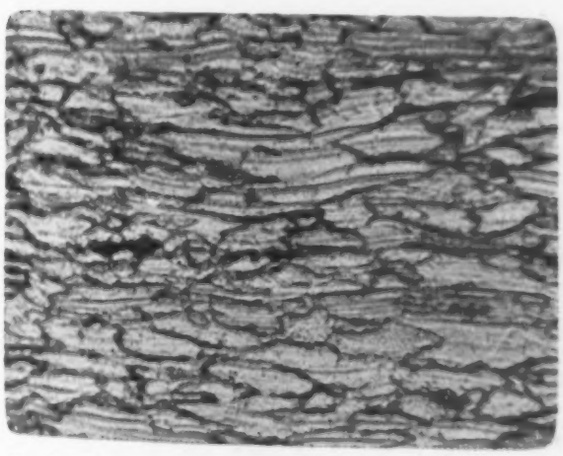

Fig. 3.—Photomicrograph of Section of Black Sheet Etched for 45 Sec. with Nitric Acid and Magnified 200 Diameters

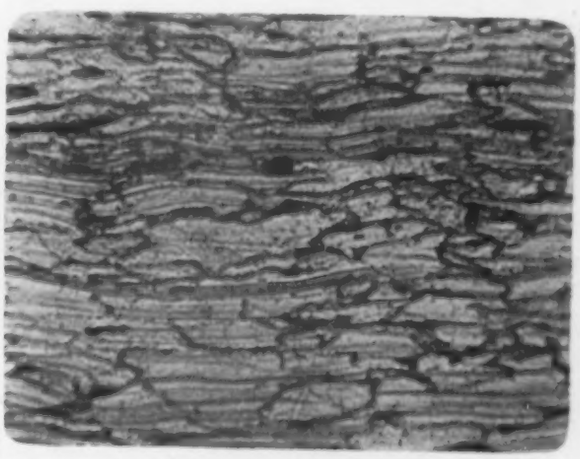

Fig. 4.—Photomicrograph of Section of Pickled Sheet Etched for 45 Sec. with Nitric Acid and Magnified 200 Diameters

All three photomicrographs included in the paper were taken out of focus, the principal difference between Fig. 2 and the others being that the former is more out of focus than the other two, and considerably over-etched. This would, of course, cause the grain boundaries to appear wider and the grain size correspondingly finer, as it is well known that etching causes a selective attack of the grain boundary rather than the grain itself, so that the boundaries become progressively deeper and wider as etching is continued. This effect occurs regardless of any treatment to which the specimen has before been subjected. Therefore, any measurement of the width of grain boundaries is of no significance in such a case, and it is furthermore rather improbable that any accurate grain size determinations could be made on a specimen prepared like the one shown in Fig. 2 of the paper.

Nevertheless, an experiment has been made to determine whether the conclusions might be justified in spite of the weak evidence for their support. Two strips of an ordinary low carbon black sheet were cut side by side and one was pickled for 10 min. in 5 per cent sulphuric acid by volume at 80 to 85 deg. C. Three bending tests were made in each of two directions at right angles on each of these sheets. The pickled sheet endured an average of 5.7 bends before failure, the other 7.7 bends. This showed the pickling to have been effective in causing the brittleness which is known to be due to hydrogen absorption.

Sections were then cut in both directions at right angles from each of these samples and were polished and etched for 10 sec. with nitric acid. The accompanying photomicrographs, Figs. 1 and 2, show the width of grain boundaries and size of grain to be practically identical in both samples. The specimens were then etched for 35 sec. more and the same spots were again photographed slightly out of focus. Fig. 3 will be seen to be the same spot as Fig. 1, and Fig. 4 the same as Fig. 2. The boundaries appear wider and the grains a trifle smaller, duplicating the effect shown in the paper under discussion. Undoubtedly the differences supposed to have been due to pickling were in reality due

to differences in the methods of preparing the photomicrographs.

GEO. F. COMSTOCK,
Metallurgical Engineer, and
A. B. WILSON,
Metallographist.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
Aug. 23, 1921.

Device for Use With Oxy-acetylene Torches

To the Editor: The writer was very much interested in the article which appeared in the Aug. 11 number of THE IRON AGE, pertaining to a device which I devised to assist in the use of oxy-acetylene cutting torches. This article appeared on page 348.

In the last paragraph a statement was made that the idea was not patented. You will please be advised, however, that patent application has been made covering the device. Perhaps this fact should be called to the attention of your readers. I might state, as a matter of interest, that I have received several inquiries regarding the scale as a result of your article.

G. R. MCDERMOTT.
Engineering Department, Illinois Steel Co., South Chicago.

Future Increase in Railroad Ton-Miles

To the Editor: Your editorial in THE IRON AGE of Aug. 25 which states that the revenue ton-miles of railroads have consistently doubled every 12 years is thought provoking. The intent of this editorial evidently is that this rate of expansion cannot be indefinitely continued because if it were, such a preponderance of wealth and men would be employed in railroading as to strangle economic life. Such a proposition, being entirely academic, can be readily granted.

On the other hand, the inference of your editorial seems to be that we have already arrived at a time when the *rate* of increase in revenue ton-miles is about to decrease. If that is to be believed, the belief should be based on "sterner stuff" than the academic proposition that a doubling of revenue ton-miles every 12 years cannot be maintained indefinitely.

Being remotely located from technical libraries, I am in no position to state to what extent water-borne commerce and the motor truck will eat into railroad tonnage, so I suggest for the present discussion that we leave probable loss of railroad tonnage out of consideration and consider probable gains—gains in the way of new business.

Mechanical power has just begun to be applied to farming. Whenever a farmer buys a tractor, motor truck, stationary engine, or electric power plant, he increases both his purchase and production of railroad ton-miles. The haul of the tractor from the factory to the farmer's station is only a small part of these newly created ton-miles. Back of the finished tractor there is a still greater railroad tonnage of iron ore, coke, limestone, and a lot of finished and semi-finished parts, and innumerable supplies. Furthermore, the tractor (and all other farm power machinery) requires fuel, lubricant, spare parts and repairs. These all make additional railroad ton-miles. The horses displaced by this power machinery were produced on the farm, and their harness and shelter were all that produced railroad ton-miles. Power farming machinery enables one man to produce more, which means that the resulting surplus labor augments city populations with their big need of ton-miles for every human need.

But most important of all, many acres of home-grown feed that would otherwise raise and maintain home-grown horses or mules now are devoted to marketable crops. This is particularly true of our best agricultural acres where heretofore farmers have provided very grudgingly the necessary acres to grow horse feed.

Before the world war it was common to quote statistics to show that the then current rate of agricultural production compared with population prognosticated a need for importing foodstuffs—in other words, we should be unable to supply enough food for ourselves. The stimulus of war prices proved that we had an enormous potential agricultural production. In time, power farming probably will increase this potential, and our farmers will be such efficient food producers that we simply must have large foreign markets for our excess production.

Power farming means farmers who are less self-sufficient, farmers who are increasingly dependent on transportation, farmers who will come to demand and insist upon 365-days-a-year roads, and these roads will require many ton-miles of crushed stone, cement, road oil, and machinery. There is still another aspect of this same situation that has an important bearing on the railroad problem. This increase in ton-miles is largely out along uncongested trunk lines.

In other words, there is nothing alarming in a doubling of railroad ton-miles every twelve years provided the railroad's average gain in efficiency per man is equal to the average gain in efficiency for the shippers.

I am strongly inclined to believe that the railroads' greatest fear of a slackening rate of increase in revenue ton-miles lies in their own failure adequately to prepare for it, not only with commodious facilities, but also efficient personnel.

In view of the influential position THE IRON AGE occupies among the class that is most interested in the future of our railroads, I hope you will not be found partly responsible for a hardening of our commercial arteries when presently we shall roll up our sleeves for some real producing.

IVAR MATTSON.
Fairfield, Iowa, Aug. 28, 1921.

Marshal Foch Will Be Guest of American Iron and Steel Institute

A cablegram from Paris, dated Sept. 13, says: "Marshal Foch has received and accepted an invitation from Elbert H. Gary, chairman of the board of the United States Steel Corporation, to be a guest at a dinner to be given by the American Iron and Steel Institute in New York.

"Marshal Foch plans to sail on the liner Paris on Oct. 22, but his further plans are as yet undecided, except that he will stop in Washington for a day on his way to Kansas City, where he will attend the convention of the American Legion."

Since the beginning of 1921, changes in rates of wages reported to the British Ministry of Labor have resulted in a reduction of about £2,840,000 in the full-time weekly wages of nearly 5,700,000 wage earners, and an increase of about £75,000 for over 300 000 wage earners. The net result is a falling off of £2,765,000 ($10,370,000 at $3.75 per £) for 6,000,000 people, or an average loss of 9¼s. ($1.73) per week.

Pittsburgh has been selected by the directors of the Industrial Cost Association for the second national cost conference, to be held Nov. 2 to 4. The directors have elected Horace N. Peck, New York, as president, and added to the board, James P. McLean, Pittsburgh, Christopher Haigh, Lynn, Mass., and E. J. Wesson, Freeport, Ill.

The Iron Age and Its Readers

The service given THE IRON AGE's readers in the full reporting in recent issues of the tariff hearings at Washington, particularly in the issue of Sept. 1, is worth noting. The amount of space given to them is one item, as is also the promptness with which the records were put into print. Enough of the dialogue with members of the committee conducting the hearings was given to round out the picture and give the atmosphere from which the reader could know what degree of coloring to give to the facts and figures. Much economic information is crowded into the arguments.

Ferromanganese "Dumping" Not Sustained

Trial Examiner's Report in the Case Before the Federal Trade Commission Is in Favor of Agents of British Producers

DISMISSAL of the complaint of the Federal Trade Commission against American importers of English ferromanganese who are charged with dumping the alloy on the United States market will be ordered if the commission accepts the conclusions of Edward M. Averill, trial examiner, who had charge of the hearings in the case. The examiner has filed his tentative report and asserts that "there is not a scintilla of evidence that the respondents or their principals commonly or systematically imported and sold ferromanganese in the United States at prices substantially less than the actual market value of ferromanganese in England."

Dealing with the claim of domestic makers of ferromanganese that the alloy was dumped in the United States in an effort to injure the industry in this country. Examiner Averill says:

> There is no evidence that the importing and selling of ferromanganese by the respondents or their principals into the United States was done with any intent to injure the industry of manufacturing ferromanganese in the United States, and there are no facts and circumstances proven from which such intent can logically or legally be inferred.

In conclusion, the examiner states:

> From the foregoing findings as to the facts, the examiner holds that the respondents were not guilty of using any unfair methods of competition in commerce as charged in the complaint and that there is no proof of any violation of section 5 of the Act of Congress approved Sept. 26, 1914, entitled "An Act to create a Federal Trade Commission, to define its powers and duties and for other purposes."

Further Steps in the Case

The report of the examiner being only tentative, it does not bring the case to a conclusion, but only represents his views for study by the commission to which the report has been submitted. The next procedure is the filing of the briefs of the commission's trial attorney, I. E. Lambert, and of the respondents, which are to be submitted by Oct. 5. The commission then will set a date for hearing the final arguments previous to rendering a formal decision. The brief of the trial attorney of the commission, it is expected, as a matter of course will take exceptions to the findings of the commission's trial examiner, while the briefs of the respondents will support the findings. The respondents include Crocker Bros. and C. W. Leavitt & Co., of New York, and Frank Samuel of Philadelphia. The complaint against Rogers, Brown & Co., New York, was dismissed in the course of the hearings, owing to the fact that they did not sell for the account of their principals in 1919 in the United States.

The Charge of Dumping

The tentative report of the examiner summarizes the case and explains developments that took place, which still are fresh in the minds of the trade, and on these bases his findings. The report states that the complaint charged that during 1919 the respondents imported and sold ferromanganese in the United States "at prices substantially less than the actual market value or wholesale price of ferromanganese prevailing in England at the time of exporting such ferromanganese to the United States, after adding to such value or wholesale price the freight and other expenses necessarily incident to the importation and sale thereof in the United States. That the said acts of importing and selling ferromanganese in the United States were done with the intent by respondents and their respective principals, of injuring the American industry of manufacturing ferromanganese and of monopolizing some part of trade or commerce in said article in the United States, and that said acts were unfair methods of competition in interstate commerce in violation of section 5 of an Act of Congress approved Sept. 26, 1914, and commonly known as the Federal Trade Commission act."

Market in War Time and Later

After setting forth importations and American production of ferromanganese during the years 1913 to 1920 inclusive, the report explains how imports were shut off during the early part of the war by the British Government and the consequent growth of domestic production, and says that during the period of hostilities the prices asked by American producers for ferromanganese ranged from $200 to $400 per ton. It is stated that a slump in the market followed the cessation of war and that during the early months of 1919 there was practically no market, with the result that most of the commercial American producers ceased the production of ferromanganese. In an endeavor to create a demand, it is pointed out, the price was cut early in 1919 from $250 and $300 to $125 per ton, but with few takers. Specific mention is made of a number of sales in the fall and winter of 1919 when prices dropped to $110 to $130, delivered. Crocker Bros. having disposed of 9720 tons for American producers and 12,095 tons for English producers. Conditions like those in the United States, it is declared, prevailed in England, which found itself with large quantities of high priced manganese ore on hand, facing strikes and a paralysis of industry and finance.

"The five years of titanic struggle," it is stated, "had reversed the financial position held for centuries by England, and from a creditor nation she passed to a debtor nation. The pound sterling was yielding to the American dollar its place as the ultimate measure of value." Drops in sterling exchange are set forth and nominal prices, in the absence of an active market, are given for ferromanganese in England.

The report says that there is no proof as to whether the American or the English producers made the first cut down to $115, but it is declared that during September, October, November and December Crocker Bros. sold ferromanganese at $95 to $110 for the account of Darwen & Mostyn Iron Co., Ltd., Darwen, Lancashire, England, while largely similar sales were being made both by importers and domestic producers, with evidence that the English makers were closely watching the market and expressed willingness to meet prices where it was claimed they had been lowered.

No Collusion

"There was no collusion between the English principals of the respondents and none on the part of respondents to fix prices. Each was in active competition with the other and incidentally they were all in competition with such American producers as had ferromanganese to sell; the efforts of the English producers were solely directed to the sale of their own product, but at the same time they were anxious to obtain the highest price possible and were reluctant to reduce the selling price. . . .

"During the entire period from June to December, 1919, the market was strictly a buyer's market and the offers came from the buyers and it was optional with the seller to either take or leave the offer made," the examiner says.

"The published English home market quotations show that the usual and customary rise or fall of ferromanganese is £2, and to be 'substantially less than the actual market value' there would have to be a drop certainly much greater than the customary market fluctuation," the report points out. "The evidence shows

that in comparatively few instances was the sterling equivalent of the American money received by the respondents less than £2 under the trade journal quotations for the home market even after taking into consideration the cost, insurance and freight and the majority of the sales were above the alleged home market quotations."

Program of National Safety Congress

The program of the tenth annual congress of the National Safety Council to be held in the State House, Boston, Sept. 26 to 30, inclusive, shows that there are the following sectional meetings, among others:

An automotive section is scheduled for Tuesday morning, Sept. 27, with Robert A. Shaw, Ford Motor Co., as chairman. Besides reports of officers and committees, papers are scheduled by J. A. Dickinson, mechanical engineer Bureau of Standards, Washington, on "Fundamental Principles of Safeguarding"; by A. L. Kaems, safety engineer Simmons Co., Kenosha, Wis., on punch press safeguarding, and by E. W. Dodge, assistant to general manager Abrasive Co., Philadelphia, on "Why Grinding Wheels Break."

A metals section will have a session also on Tuesday morning, Sept. 27, under the chairmanship of J. A. Oartel, chief of safety bureau, Carnegie Steel Co., Pittsburgh, with John A. Northwood, superintendent safety and welfare department, Cambria Steel Co., Johnstown, Pa., as vice chairman, and J. R. Mulligan, supervisor accident prevention and education, Bethlehem Steel Co., Bethlehem, Pa., as secretary. The papers scheduled for this session include one on "Safe Practices in Pouring in a Foundry," by A. B. Root, Jr., mechanical engineer Hunt-Spiller Mfg. Corporation, Boston; on "Elimination of Steam During Pouring," by R. E. Shaw, district manager B. F. Sturtevant Co., Boston, and on "Electrical Hazards in Foundries and Steel Mills" by Walter Greenwood, safety engineer Carnegie Steel Co., Youngstown, Ohio.

A second session of the metals section, scheduled for Wednesday afternoon, Sept. 28, lists a paper on "Safe Practices in Rolling Mills" by Fred Johnson, superintendent of rolling mills South Works, American Steel & Wire Co., Worcester, Mass., and one on "Safe Practices at By-Products Coke Plants" by F. F. Marquard, superintendent by-products plant Clairton Works, Carnegie Steel Co., Clairton, Pa.

A general round table meeting, scheduled likewise for Tuesday morning, Sept. 27, and to discuss safety bulletins, will be under the chairmanship of George T. Fonda, manager safety and compensation division, Bethlehem Steel Co., Bethlehem, Pa. An education section, also scheduled for Tuesday morning, Sept. 27, will be under the chairmanship of A. T. Morey, general manager Commonwealth Steel Co., Granite City, Ill.

A joint meeting of manufacturing sections is scheduled for Thursday morning, Sept. 29, and the program covers industrial lighting and the need of accident prevention work and the methods to be employed during the present industrial depression, the latter to be opened by W. E. Worth, International Harvester Co., Chicago.

J. F. Tinsley, general manager Crompton & Knowles Loom Works, Worcester, is to contribute to the discussion of what is called the A B C session, Tuesday afternoon, Sept. 27, on "The Essentials of a Plant Safety Organization," and Harry Gilbert, manager safety department, Haskell & Barker Car Co., Michigan City, Ind., is to discuss "The Foreman as the Determining Factor."

Consideration will be taken of the recent tentative classification of scrap put out by the American Railway Association at the quarterly meeting of the scrap iron division of the National Association of Waste Material Dealers at the Hotel Astor, New York, on Sept. 22, 11.30 a. m. The classification contains provisions including terms of sale. A report may be made by the committee appointed to draw up a set of trade customs for scrap iron dealers and consumers.

COMING MEETINGS

September

National Association of Cost Accountants. Sept. 14 to 16. Fall convention, Cleveland Hotel, Cleveland. Session on morning of Sept. 15 on cost methods of trade associations. Offices of association at 130 West Forty-second Street, New York.

American Society for Steel Treating. Sept. 19 to 24. Annual convention and exhibition, Manufacturers Building, State Fair Grounds, Indianapolis. Secretary, W. H. Eisenman, 4600 Prospect Avenue, Cleveland.

Association of Iron and Steel Electrical Engineers. Sept. 19 to 25. Annual convention, Hotel La Salle, Chicago. Secretary, J. F. Kelly, 513 Empire Building, Pittsburgh.

Annual Safety Congress. Sept. 26 to 30. Boston. Auspices of National Safety Council.

American Electrochemical Society. Sept. 29, 30 and Oct. 1. Fall meeting, Lake Placid Club, Lake Placid, N. Y. Secretary, Prof. Joseph W. Richards, Lehigh University, Bethlehem, Pa.

October

American Manufacturers Export Association. Oct. 5 and 6. Annual meeting, Waldorf-Astoria Hotel, New York. Secretary, A. W. Willmann, 150 Broadway, New York.

Society of Industrial Engineers. Oct. 5 to 7. Fall meeting, Springfield, Mass. Business Manager, George C. Dent, 327 South La Salle Street, Chicago.

National Association of Purchasing Agents. Oct. 10 to 13. Claypool Hotel, Indianapolis.

National Implement and Vehicle Association. Oct. 12 to 14. Chicago.

National Machine Tool Builders' Association. Oct. 18, 19 and 20. Annual meeting, Hotel Astor, New York. General Manager, E. F. DuBrul, 417 Provident Bank Building, Cincinnati.

Industrial Relations Conference. Oct. 24 to 27. Harrisburg, Pa., under auspices of Department of Labor and Industry of Pennsylvania.

November

National Founders' Association. Nov. 16 and 17. Annual meeting, Hotel Astor, New York. Secretary, J. M. Taylor, 29 South La Salle Street, Chicago.

Fabrication in Transit Granted for Sheets

WASHINGTON, Sept. 13.—In a decision handed down last Thursday, the Interstate Commerce Commission held that failure of the railroads to accord fabrication in transit at Parkersburg, W. Va., on iron and steel sheets is not unreasonable, but is unduly prejudicial, and entered an order requiring the carriers on or before Dec. 1 to abstain from such undue prejudice. The complainant is the Parkersburg Rig & Reel Co. The B. & O. at the hearing expressed its willingness to accord fabrication in transit at Parkersburg on all forms of structural steel, but not on sheets. The decision, after pointing out that fabrication of sheets is allowed in western territory, enters into a discussion as to the meaning of plates and sheets and states that the complainant in its brief quoted from an authority on metallurgy to show that the terms plates and sheets are used interchangeably and that, technically, plates are sheets and sheets are plates up to No. 20 gage. No distinction between the two products is made by the carriers in western territory in their tariffs, and it is stated that the evidence is not convincing that the granting of fabrication in transit on sheets of No. 16 gage or heavier would result in any undue extension of the fabrication arrangement. Pointing out that competition exists throughout the country between sheet and plate tanks, the decision quotes the complainant to the effect that unless accorded fabrication on sheets it will be compelled to abandon manufacture of sheet-metal tanks because the difference between the combination rates on Parkersburg, which it is now obliged to pay, and the joint rates with fabrication at that point, amounts on the average to about 23c. per 100 lb.

Chicago Building Trades Still Troubled

Decision of Judge Landis Not Accepted by All Unions and Outlook is Uncertain—The Arbiter's Graphic Description of Conditions

CHICAGO, Sept. 10.—After deliberations lasting throughout the summer, Federal Judge Kenesaw M. Landis, umpire in an arbitration of wage differences between employers and employees in the Chicago building industry, announced his decision on Sept. 7. Wage reductions of from 10 to 36 per cent for skilled and unskilled labor were stipulated and hampering working rules and regulations were wiped out. "Reliable testimony," said the judge, "showed that a 20 per cent reduction in wages, other conditions remaining the same, would produce but a 6 to 7 per cent reduction in building cost. The real malady lurked in a maze of conditions artificially created to give the parties a monopoly and in rules designed to produce waste for the mere sake of waste, all combining to bring about an insufferable situation, not the least burdensome element of which was the jurisdictional dispute between trade members of the same parent organization."

According to the terms of agreement between the parties to the dispute when Judge Landis was appointed umpire, the rates he determined were to remain in force until May 31, 1922, when, or before, he would determine rates for the ensuing year. The announcement of the decision was at first hailed as the final settlement of a long disturbed industrial situation and as the harbinger of a long delayed building boom. Subsequent developments cast doubt on the finality of the award and revive uncertainties which have hitherto held back much projected construction work. Workmen belonging to a number of crafts have expressed their dissatisfaction with the decision by walking out. Four big Chicago jobs, the Federal Reserve Bank, the Northwestern Railroad grain elevator, the Commonwealth Edison Co. power plant and the Quadrangle Club building, are now at a standstill as a result of walkouts by hoisting engineers, steamfitters, plumbers and marble setters.

Unsatisfactory Attitude of Labor

Unless there is a decided change in the attitude of labor, it is unlikely that the local building situation will show any marked improvement. As stated by the judge, "it is no violation of confidence to say that building construction had gotten into bad repute in this community. There was a general disposition to keep away from it as a thing diseased. Capital avoided it. The wise dollar preferred almost any other form of activity or no activity. And this applied to the whole range of building construction, from the cottage to the skyscraper."

The loss of the public faith, the judge pointed out, was not due entirely to the wage question. Harmful and wasteful rules and agreements and jurisdictional strife were more important causes. Consideration of these facts led the judge to fix higher rates of wages for those crafts which agreed to the elimination of these abuses than for those which stubbornly refused to abandon certain practices. The "uniform agreement" applicable to all trades, as worked out by the judge, includes the following salient points:

Points of the Decision

1. That there shall be peaceful adjustment of disputes by arbitration, subject to appeal to the National Board of Jurisdictional Awards, with whose decisions all parties agree to comply.

2. That in case of scarcity of help non-union men may work with union men until such a time as union men may be obtained.

3. That any journeyman may use in his work the tools of any other trade.

4. That small tasks of not over 30 min. duration in any one day belonging to any trade may be performed by any other trade at the discretion of the employer.

5. That there shall be no restriction as to the amount of work a man may do, nor against the use of machinery, methods or appliances, nor against any raw or manufactured material except prison made.

6. That employers may employ or discharge whomsoever of the union they please, and employees may work for whomsoever they see fit.

7. That the foreman, if any, is to be exclusively the agent of the employer.

In fixing the wages of three trades which require work to be done by skilled men that laborers or helpers might do, the judge stated that he was obliged to consider the waste thus occasioned. If, however, these trades expressed their willingness to change their attitude, the judge will advance their wages accordingly. The following trades were not in the arbitration: Carpenters, elevator constructors, plasterers, sheet metal workers, painters, glaziers, fixture hangers.

Gradually Adopting Frick Scale

UNIONTOWN, PA., Sept. 12.—A number of independent coal and coke operations, including the Republic plant of the Republic Iron & Steel Co., Tower Hill No. 1 plant and the plants of the American Coke Corporation, posted notices late last Friday night of increases in wages to the present H. C. Frick Coke Co. scale in this region, being the scale of November, 1917. It is believed that majority of the other independent operations in the region will take similar action, which was started 10 days ago when George Whyel, head of the Whyel interests, announced that the Frick scale would be restored at his plants.

W. J. Rainey, Inc., whose plants are idle as result of refusal of the employees to accept wage reductions approximately 15 to 20 per cent under the Frick scale, adopted the latter, effective Sept. 12. The other independent operations had not followed the Rainey action in its latest cuts.

Action of the other independents means an increase of approximately 10 per cent in scales.

Similar notices, reverting upward to the Frick scale, are expected to be posted at most of the independent operations in the county within the next week.

In Rainey circles it was stated that their plants could not operate unless the present Rainey scale was maintained.

So far the H. C. Frick Coke Co. has taken no action toward a reduction in wages in line with announcement of such readjustment by the Steel Corporation effective Aug. 29. No reduction is expected in the region at this time. Frick operations are being maintained at about 40 per cent coal, with all ovens out of blast.

Some Improvement in Cleveland

The labor situation in Cleveland shows a little improvement, according to the monthly report of the committee on labor relations of the Cleveland Chamber of Commerce. Ninety-nine plants engaged in various industries, each normally having 500 more employees, showed an increase in working forces on Aug. 31 of 1.5 per cent as compared with July 31. The report a month ago showed a gain of 2.5 per cent as compared with June 30. Plants making iron and steel and their products, exclusive of the plants of the United States Steel Corporation, showed a gain of 3 per cent on Aug. 31 as compared with July 31. Automobile plants, and plants making automobile accessories, made a gain of 2.9 per cent. Metal working plants other than iron and steel, these including brass foundries, showed a decrease of 2.40 per cent.

Iron and Steel Markets

ADVANCE IN WIRE

Large Orders Placed at Recent Prices

Important Increase in Steel Output—August Betterment Continues

An advance of $2 to $3 per ton in the prices of the American Steel & Wire Co., effective Sept. 10, has broken the long succession of declines in steel products. Wire prices have been the lowest on the list in relation to cost, and the fact that there had been little cutting in the past two months seemed to invite an effort to turn the tide. Independent producers have followed the Steel Corporation advances, and all mills made large bookings at the old prices before the advances went into effect.

The heavy influx of wire and wire nail orders just before the advance showed the country to be bare of stocks to a degree never known. Jobbers covered 60-days requirements while manufacturing consumers in many cases bought for longer periods. Wire fence, in view of low agricultural buying power, remains at the old price.

The Steel Corporation's wire production, in response to the restocking orders, has gone up to 40 per cent of capacity and promises to increase further. In sheets and tin plate the corporation's rate is still 50 per cent. For all subsidiaries the average is 33 per cent, against 30 per cent in August.

A reduction of 298,000 tons in unfilled orders in August has a more favorable construction than was generally given when it is stated that shipments were 100,000 tons more in August than in July.

That the customers of independent steel companies also called for increased shipments last month appears from a steel ingot output for the country in August of 1,351,628 tons. At 27 working days this was 50,060 tons per day, or 31 per cent greater than the daily rate of 38,126 tons for the 25 working days in July.

While reports are not of one tenor, demand on the whole is better than in August, indicating that July was the low month of the nine. Apart from wire, prices tend lower, the heavy products, plates, shapes and bars lagging most.

In the past week 1.50c. was touched on steel bars, on an exceptional three months' contract, but most sales were at $2 to $3 per ton higher. A number of plate and shape transactions have established a range of 1.60c. to 1.65c.

Irregularity continues in wrought pipe and the discounts last formally announced have yielded by two to three points.

Automobile plants are reducing their stocks in anticipation of slackening sales in the fall. The largest producer expects to buy less steel in October than in September.

Shading of $1 per ton has been done on blue annealed sheets. Warehouse prices on black sheets have been reduced $5 per ton. A Cleveland mill has taken 750 tons of 30-gage black sheets for Japan.

Fully 25,000 tons of fabricated steel work was awarded in the week, including 15,000 tons for the Federal Reserve Bank in New York, and 3000 tons for viaducts in Pittsburgh. About 6000 tons of new work has been added to pending projects. The country's fabricating capacity is in excess of 41,000 tons per week.

Equipment inquiries show some increase. One from the Rio Grande is for 1000 steel cars and the Lackawanna is asking for 1000. The B. & O., which is in the market for 1000 cars and 1000 steel underframe box car bodies, is also figuring on the repair of 3000 to 6000 freight cars of various types.

The pig iron market has been enlivened by inquiries in the East amounting to about 20,000 tons, of which nearly half comes from companies closely connected with railroads. Chicago also shows considerable activity, with prices on foundry, malleable and basic advanced $1.

The stronger situation in scrap is a reflex of what has developed in pig iron. A slight advance in coke is due to the cutting down of output by strikes and in part to larger consumption of blast furnace coke. With wage restoration at independent works to the Frick Coke Co. scale, the strikes are ended.

British ferromanganese has been reduced this week to $58.35, Baltimore, as against a previous market of $65.

Our cable report puts the British steel output for August at 432,600 tons, indicating a marked recovery from the coal strike, as this is close to the January and February rate. Pig iron output at 93,600 tons in August is still abnormally low. Steel companies are working into a better market position as German and Belgian works become farther filled up.

Pittsburgh

PITTSBURGH, Sept. 13.

Increases in wire products ranging from $2 to $3 per ton and the development of a stronger market in scrap and coke have been the outstanding developments of the week in the iron and steel situation. Before advancing prices, the several makers permitted their customers to enter orders for their requirements over the next 60 days for the merchant trade and 90 days for manufacturers. The response has been fairly satisfactory in the matter of orders and now that market prices are above those which buyers paid, it is expected that there will not be much hesitancy about specifications.

The stronger tendency in scrap prices is a direct reflection of the upward trend of pig iron and the fact that production and available supplies are of moderate proportions. Coke prices have advanced because of the revision upward of independent wage scales in the Connellsville district made necessary by the labor troubles growing out of the wage cut made a few weeks ago by W. J. Rainey, Inc. Many of the Connellsville district mining companies were feeling the effects of the strikes. All but one or two of the independent operators have put wages back to the Frick scale, which means an increase of about 10 per cent over the recent scale. W. J. Rainey, Inc., is among those which have adopted the Frick scale. More inquiry and larger sales also have played a part in this advance.

Reports about business in steel vary considerably,

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Sept. 13, 1921	Sept. 6, 1921	Aug. 16, 1921	Sept. 14, 1920
No. 2X, Philadelphia‡	$20.84	$20.84	$20.34	$53.51
No. 2, Valley furnace†	21.00	21.00	19.50	50.00
No. 2 Southern, Cin'ti†	23.50	23.50	23.50	46.50
No. 2, Birmingham, Ala.†	19.00	19.00	19.00	42.00
No. 2 foundry, Chicago*	**22.00**	21.00	20.00	46.00
Basic, del'd, eastern Pa.	**19.25**	19.00	19.00	51.26
Basic, Valley furnace	19.00	19.00	18.00	48.50
Bessemer, Pittsburgh	21.96	21.96	21.96	50.46
Malleable, Chicago*	**22.00**	21.00	20.00	46.50
Malleable, Valley	20.00	20.00	20.00	50.00
Gray forge, Pittsburgh	21.96	21.96	21.46	50.96
L. S. charcoal, Chicago	33.50	33.50	33.50	58.50
Ferromanganese, del'd	70.00	70.00	70.00	170.00
Rails, Billets, etc., Per Gross Ton:				
Bess. rails, heavy, at mill.	$45.00	$45.00	$45.00	$55.00
O.-h. rails, heavy, at mill.	47.00	47.00	47.00	57.00
Bess. billets, Pittsburgh	29.00	29.00	30.00	60.00
O.-h. billets, Pittsburgh	29.00	29.00	30.00	60.00
O.-h. sheet bars, P'gh.	30.00	30.00	32.00	67.50
Forging billets, base, P'gh.	34.00	34.00	35.00	75.00
O.-h. billets, Phila.	35.74	35.74	35.74	65.74
Wire rods, Pittsburgh	38.00	38.00	42.00	75.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh., lb.	1.70	1.70	1.75	3.25
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	*1.95*	2.00	2.05	4.85
Iron bars, Chicago	1.75	1.75	1.75	3.75
Steel bars, Pittsburgh	1.65	1.65	1.75	3.25
Steel bars, Chicago	1.85	1.85	1.93	2.84
Steel bars, New York	2.03	2.03	2.13	4.13
Tank plates, Pittsburgh	*1.65*	1.70	1.80	3.25
Tank plates, Chicago	1.75	1.75	1.98	3.03
Tank plates, New York	*2.03*	2.08	2.18	3.63
Beams, etc., Pittsburgh	*1.65*	1.70	1.85	3.10
Beams, etc., Chicago	1.80	1.80	1.98	2.83
Beams, etc., New York	*2.03*	2.08	2.23	3.48
Steel hoops, Pittsburgh	*2.15*	2.25	2.25	5.50

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Sept. 13, 1921 Cents	Sept. 6, 1921 Cents	Aug. 16, 1921 Cents	Sept. 14, 1920 Cents
Sheets, black, No. 28, P'gh.	2.75	2.75	3.00	7.50
Sheets, galv., No. 28, P'gh.	3.75	3.75	4.00	9.00
Sheets, blue an'l'd, 9 & 10.	*2.20*	2.25	2.25	5.50
Wire nails, Pittsburgh	**2.90**	2.75	2.75	4.25
Plain wire, P'gh	**2.60**	2.50	2.50	3.75
Barbed wire, galv., P'gh.	**3.55**	3.40	3.40	4.45
Tin plate, 100-lb. box, P'gh.	$5.25	$5.25	$5.25	$9.00
Old Material, Per Gross Ton:				
Carwheels, Chicago	*$15.50*	$13.75	$13.00	$37.00
Carwheels, Philadelphia	17.00	17.00	16.00	43.00
Heavy steel scrap, P'gh.	**13.50**	13.00	13.00	28.50
Heavy steel scrap, Phila.	11.50	11.50	11.50	26.50
Heavy steel scrap, Ch'go.	11.00	11.00	10.75	24.50
No. 1 cast, Pittsburgh	**17.00**	16.50	16.00	42.00
No. 1 cast, Philadelphia	17.00	17.00	17.00	40.00
No. 1 cast, Ch'go (net ton)	13.25	13.25	13.00	34.50
No. 1 RR. wrot, Phila.	**15.00**	14.50	14.00	34.00
No. 1 RR. wrot, Ch'go (net)	11.50	11.50	11.00	24.00
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt	**$3.25**	$3.00	$2.75	$16.50
Foundry coke, prompt	**4.25**	4.00	3.75	17.50
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	**12.25**	12.00	12.00	18.75
Electro ytic copper, N. Y.	**12.00**	11.75	11.75	18.75
Zinc, St. Louis	4.20	4.20	4.20	7.80
Zinc, New York	4.70	4.70	4.70	7.80
Lead, St. Louis	**4.40**	4.30	4.25	8.25
Lead, New York	**4.60**	4.50	4.40	8.37½
Tin, New York	*26.75*	27.25	26.12½	45.00
Antimony (Asiatic), N. Y.	*4.45*	4.50	4.50	7.12½

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Composite Price, Sept. 13, 1921, Finished Steel, 2.279c. per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets — These products constitute 88 per cent of the United States output of finished steel.

Sept. 6, 1921,	2.279c.
Aug. 16, 1921,	2.364c.
Sept. 14, 1920,	3.974c.
10-year pre-war average,	1.684c.

some companies finding that the gain in August has not been maintained, while others say that bookings so far this month compare very favorably with those of the same period last month. One important producer has taken a substantially larger tonnage this month than in the same period in August. Activity still is lacking in the heavy tonnage products, despite the fact that the outlook for structural business in this district is brighter to-day than it has been in more than a year. In some quarters there is a tendency to ascribe the increase in structural inquiries to a desire on the part of the general contractors to get under cover before snow flies. Building laws of the city of Pittsburgh are to be amended so that in the future no structures of more than 10 stories will be permitted in the downtown business section. Investors have been seeking permits for higher structures to escape the new law. Actual awards in the past fortnight, however, have been larger than they were previously in some time and because of this some are inclined to believe that the period of waiting is almost at an end.

Demand for prompt tonnages of tin plate still is good and general sheet business is fairly active, although the independent companies have not been getting as many orders this month as were coming to them in August. Buying of tubular goods is entirely hand to mouth, but must be said to be pretty constant as far as standard or merchant pipe is concerned. A cut in resale prices of pipe by jobbers handling the product of the National Tube Co. last week brought reports that this company would cut mill quotations, but there is official denial that any such step is under consideration. Considerable irregularity still marks prices, but with the exception of wire products the drift is lower. It is now admitted that plates and shapes can be bought as low as 1.60c. base, while hoops have gone as low as 2.15c. and bands down to 2c., as compared with 2.25c., the recent quotation on both products.

The pig iron market again has become extremely dull. Makers, however, are holding tenaciously to the advances recently established.

There is no appreciable change in plant activities in this and nearby districts except that there is a possibility of one merchant and one steel works furnace blowing in at an early date.

Pig Iron.—Business is very slack again with prices of all grades well maintained, but based upon only small tonnages. The largest sale reported is one of 1000 tons of Bessemer, which sold at about $20, Valley furnace, but was not for this district. Interest in basic is not particularly keen because melters either have no pressing needs or cannot see their way clear to pay the present asking price of most makers of $20, furnace, in view of the fact that the recent rise from $18 to $20 has not been accompanied by a corresponding increase in prices of finished steel products. Since the advance in iron has enhanced scrap prices, the opportunity for cutting steel costs is slight. All makers evidently are not holding religiously to $20, furnace, since one melter who has been in the market pretty constantly lately insists he has not been obliged to go that high. Foundry iron sales are few and small. Merchant producers are getting $21 for the base grade for carloads, but there is a fairly authentic report that

one of the steel companies recently sold 10,000 tons of foundry iron at $19.50, Valley furnace. It is reported that the A. M. Byers Co. has put out the inquiry for the coke required for its Mattie furnace at Girard, Ohio, but blowing in of this furnace still is in doubt and the decision rests upon the company being able to secure 12,000 tons of forge iron at a price lower than it can make it, and as to whether there is going to be a market for the surplus over its own requirements.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being $1.96 per gross ton:

Basic	$19.00 to $20.00
Bessemer	20.00
Gray forge	20.00
No. 2 foundry	21.00
No. 3 foundry	20.50
Malleable	20.00

Ferroalloys—Interest in the market is almost nil. The Valley inquiries for ferromanganese, one for 100 tons and the other for 200 to 300 tons, have been deferred because prices named have been above the ideas of the prospective buyers. The company seeking the larger tonnage has set $60 delivered Youngstown as its maximum. Foreign material, said to be English, has been offered as low as $57 c.i.f. Atlantic seaboard, which would mean $63.16 delivered Youngstown. The nominal quotation of English makers is $65 c.i.f. Atlantic seaboard, while domestic makers are quoting $75 delivered, though no recent business has been done at above $70 delivered. We note sales of only one or two carloads of spiegeleisen within the range quoted. A Pittsburgh jobber is seeking a car of 50 per cent ferrosilicon. Most makers are quoting $65 furnace, freight allowed, on this alloy but $60 is about as high as sales can be done to-day.

We quote 78 to 82 per cent domestic ferromanganese at $70 delivered; 76 to 80 per cent, $68; 78 to 82 per cent British ferromanganese, $58 to $65, c.i.f. Atlantic seaboard. We quote average 20 per cent spiegeleisen at $30 to $32, delivered, Pittsburgh or Valleys; 50 per cent ferrosilicon, domestic, $60, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, $36.50; 11 per cent, $39.80; 12 per cent, $43.10; 13 per cent, $47.10; 14 per cent, $52.10; silvery iron, 6 per cent, $25; 7 per cent, $26; 8 per cent, $27.50; 9 per cent, $29.50; 10 per cent, $31.50; 11 per cent, $34; 12 per cent, $36.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is $4.06 per gross ton.

Billets, Sheet Bars and Slabs.—Hardly enough is going on to clearly determine prices. Non-integrated sheet makers do not seem to be any busier than they have been and consequently are not very large buyers of sheet bars. The common quotation is $30, Pittsburgh or Youngstown, but reports continue that sales have been made from $1 to $2 per ton lower. There is even less interest in billets and slabs than there is in sheet bars, due to the fact that the demand for plates remains limited and few of the merchant mill products are selling at all freely. There is no reason to change quotations.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at $29 to $30; 2 x 2-in. billets, $30; Bessemer and open-hearth sheet bars, $30; slabs, $30; forging billets, ordinary carbons, $34 to $35, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—The American Steel & Wire Co. has announced a price of $41 for the base size of common soft steel and this price probably will become the "official" quotation of independent makers. There is not much demand and some uncertainty exists as to whether the new price can be obtained, in view of the fact that the bulk of recent business was done at $38 to $40. Prices are given on page 703.

Structural Material.—The American Bridge Co. has taken 3000 tons for the viaducts for the Boulevard of the Allies, Pittsburgh, its bid being $195,265. The same company also has secured 13 all steel deck barges with the option of taking two more, placed through the United States Engineer's Office, Memphis, Tenn., for service in the Memphis and Vicksburg districts, at $9,250 each. About 3000 tons of steel will be required for these barges. The Jones & Laughlin Steel Co. has taken 550 tons for a new plant at St. Louis for the Standard Underground Cable Co., Pittsburgh. The McClintic-Marshall Co. has taken 125 tons of I-beams for the Palatka Bridge, South Jacksonville, Fla., 100 tons for a storage building for the Union Ice Co., Pittsburgh, and 150 tons for the New York Steam Corporation placed through Stone & Webster, Boston. The Bell Telephone building, which will take 2000 tons, the Y. M. C. A. building, requiring 1500 tons, and the Joseph Horne Co., building, which takes 3500 tons, are expected to be placed before long. Plain material does not reflect in demand the orders which have been placed or are pending. As low as 1.60c. has been done but on small lots 1.70c. and 1.75c. still are quoted. Prices are given on page 703.

Iron and Steel Pipe.—A report late last week that jobbers handling the product of National Tube Co. had revised downward resale prices of standard pipe $6 to $7 per ton and 5 per cent on oil country pipe, started much speculation as to the possibility of a reduction in mill prices by that company. It is officially stated that a reduction in mill prices has not been considered and that the cut in resale prices merely is the result of competitive trade conditions. Until recently the National Tube Co. was not meeting competition and naturally resale prices of jobbers handling its pipe were somewhat above those distributing the product of independent mills. General conditions in tubular goods otherwise are much as they have been during the past two weeks. There is a very fair run of orders from jobbers in merchant pipe and no important deviation from published discounts. Oil well pipe still is very slow of sale and no improvement is looked for until along toward the end of the year or the early part of 1922 when the oil companies are figuring on next year's drilling program. Standard Oil companies are reported to be interested in line pipe and one of them is reported to have placed 30 miles of 6-in. pipe. Prices of this class of material do not have very close relation to published prices. Discounts are given on page 703.

Nuts, Bolts and Rivets.—Outside of the fact that specifications against old orders are somewhat larger than they have been, there is no special change in the situation. Pittsburgh makers are not particularly anxious for business at the prices they would have to meet in competition with those in other centers. Prices and discounts are given on page 703.

Iron and Steel Bars.—The attempt to obtain tonnages of merchant steel bars at less than 1.65c. does not seem to be succeeding and important makers now report that not much difficulty is experienced in obtaining that price. Some makers still are quoting 1.75c. on business in this district because they would be obliged to absorb the freight. Such business as has been done, however, is within a range of 1.65c. to 1.70c. Concrete bars rolled from billets take the same range as mild bars, while those rolled from old rails are quoted at 1.60c., but business in both kinds is limited. Orders for iron bars are reported to be more numerous than they were recently.

We quote steel bars rolled from billets at 1.65c. to 1.70c.; reinforcing bars, rolled from billets, 1.60c. to 1.70c. base; reinforcing bars, rolled from old rails, 1.60c.; refined iron bars, 2.25c. in carloads, f.o.b. mill, Pittsburgh.

Spikes.—Railroads are inquiring pretty constantly for small lots of standard spikes, but actual business still is of limited proportions. Makers here are quoting $2.50 per 100 lb. base, but find it necessary to shade this price to meet competition from other districts. Similarly, small spikes are quoted at $2.75 per 100 lb. base by local makers, but competitive offerings necessitate going as low as $2.65 to get some orders. Prices are given on page 703.

Steel Rails.—Some improvement is noted in specifications against old orders for standard rails, but light sections still are in slow demand and the quotation of 1.75c. for new steel rails is merely nominal. An attractive inquiry undoubtedly would develop a price of 1.70c.

We quote 25 to 45 lb.- sections, rolled from new steel, 1.75c.; rolled from old rails, 1.60c.; standard rails, $45 mill for Bessemer and $47 for open-hearth sections.

Plates.—There is still room for considerable improvement in the demand and competition for passing

orders is so keen that the price advantage is entirely with buyers. On the basis of what is going on, the market is quotable from 1.60c. to 1.70c.

We quote sheared plates, ¼ in. and heavier, tank quality, at 1.60c. to 1.70c. f.o.b. Pittsburgh.

Sheets.—While the American Sheet & Tin Plate Co. continues to report an improvement in business and has added further to its active capacity since a week ago, when it had 50 per cent of its mills in operation, the experience of most of the independent makers is that orders this month have not been as large as they were in August. Automobile sheets are not in as good demand as they were recently due to the seasonable decline in production, and also to the fact that some plants have lost business because of price competition and are obliged to curtail schedules. Cutting of the regular market prices of sheets no longer amounts to much and the market may be regarded as steady at 2.75c. base for black, 3.75c. base for galvanized and 2.25c. base for blue annealed. Prices are given on page 703.

Wire Products.—Independent manufacturers have followed the American Steel & Wire Co. which, effective at close of business last Saturday, advanced nails from $2.75 base per keg to $2.90 and plain wire from $2.50 per 100-lb. to $2.60. Coated nails were advanced 10c. to $2.45 per count keg. From the standpoint of costs, no one disputes that the increase was justified, because all products, nails in particular, were selling at a loss at the old quotations. The advance will have the effect of making solid the business now on the books of makers, but there is also the well-known fact that, when there is not enough business to go around, difficulty is often experienced in maintaining new prices. Business was showing improvement when the advance was announced and a good many additional orders than otherwise might have been placed have been taken by manufacturers and jobbers, who were allowed to cover for requirements for 90 and 60 days respectively.

We quote wire nails at $2.90 base per keg, Pittsburgh, and bright basic and Bessemer wire at $2.60 base per 100 lb., Pittsburgh.

Tin Plate.—Demand is holding up unusually well for this time of the year, and the market is firm, due to the fact that manufacturers of perishable food containers underestimated their requirements, while several independent manufacturers, who formerly operated under an agreement with the Amalgamated Association of Iron, Steel and Tin Workers and now are figuring on adopting the open shop policy, are out of production. Stock tin plate has become pretty well cleaned up, and while occasional sales are made at less, the more common price is $4.75 per base box. Production tin plate is firm at $5.25. The American Sheet & Tin Plate Co. has more than 50 per cent of its tin mills under power.

Hoops and Bands.—The market is weaker, notably on bands, which the past week or so have sold as low as 2c. On hoops the common quotation is 2.25c. base, but business has been done as low as 2.15c. Demand is moderate and competition for passing orders is sharp.

Hot-rolled and Cold-rolled Strips.—The automobile price war is finding reflection in orders which so far this month have fallen off somewhat as compared with August. Automobile makers who have not reduced prices are getting fewer orders and are curtailing production. Some demand is coming from builders' hardware manufacturers, but it is of a piecing out character. Business in hot-rolled strips has been done and lost at 2.25c. base, the market being quotable from 2c. to 2.25c. Cold-rolled strips are quotable from 3.75c. to 4c. base, but the higher figure is passing except for small lots.

Cold-Finished Steel Bars and Shafting.—The market still lacks activity. Slowing down in automobile plant activities, common to this time of the year, is affecting the demand for cold-rolled and cold-drawn steel and has led to some holding up of shipments against orders already in. The common quotation is 2.40c. base, Pittsburgh, but it is reported that the American Steel & Wire Co. is going as low as 2.35c. to secure orders and that some independents are meeting that figure. Shafting demands are limited. Cold-rolled or drawn shafting is quotable at 2.35c. to 2.40c. base, Pittsburgh, and ground shafting at 2.75c. base, mill, in carloads.

Coke and Coal.—The coke market still is feeling the effects of the labor troubles in the Connellsville district. The market has advanced at least 25c. per ton on both furnace and foundry grades. The spot or prompt market on furnace grade now is not quotable at less than $3.25 per net ton, oven, which is believed to be the price paid by the Wickwire-Spencer Steel Corporation, Buffalo, for 10,000 tons for immediate delivery. Brokers lately have been paying this price and this means that the cost to consumers is around $3.35 to $3.40. On contracts covering the remainder of the year, the common quotation is $3.50 per net ton, oven, and some operators who are well sold ahead on coal are not willing to take future business even at that price. The A. M. Byers Coal Co. again is considering blowing in its furnace at Girard, Ohio, and is asking for prices on 15,000 tons a month for last quarter. Foundry coke is moving steadily in small lots at $4.25 to $4.50 per net ton, ovens. The coal market is fairly firm at $1.75 to $2 for mine run steam and by-product coal and $2.25 to $2.75 for gas coal.

Old Material.—The market still has a strong undertone, although the consumptive demand often before has been greater than it is at present. The situation derives its strength more from the fact that available supplies are moderate than because there is a really good demand. This market also is affected by the fact that competing markets are netting shippers higher prices than are obtainable here. All dealers have rather sizeable stocks of steel works grades on their yards, but average costs are so high that none of this material is being offered. Production of scrap, meanwhile, reflects sub-normal building and machine shop activities, not to mention the fact that the automotive industry is slowing down as is usual at this time of the year, while the farmers of the country seem to be making their old implements do. The common bid for heavy melting steel is $13 per gross ton, delivered, but none of this grade recently has sold that low and some melters willing to throw such material down on their yards at $13.50 have failed to secure any. It is really doubtful whether any of this grade today could be bought at less than $14. One company, although a little fastidious as to quality, is paying $14 for material which ordinarily is graded as heavy melting steel. The recent stiffening in the price of pig iron tends to increase the use of scrap and to enhance its value. Machine shop turnings cannot be bought at less than $8.50, although some users are trying to obtain supplies at $8. The United States Cast Iron & Foundry Co. is reported to have bought some tonnages in the East of cast iron wheels and No. 1 cast scrap for its Scottdale, Pa., works, paying about $17 for wheels and from $17.50 to $18 for No. 1 cast, delivered Scottdale. These prices are well above what dealers here claim to be able to get. They report bids of $15.75 to $16 on cast iron wheels and $17 to $17.50 on No. 1 cast.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh	13.50 to	14.00
No. 1 cast cupola size	17.00 to	17.50
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Parkersburg and Huntington, W. Va., and Franklin, Pa.	16.00 to	16.50
Compressed sheet steel	10.75 to	11.00
Bundled sheet sides and ends, f.o.b. consumers' mills, Pittsburgh dist.	9.50 to	9.75
Railroad knuckles and couplers	14.50 to	15.00
Railroad coil and leaf springs	14.50 to	15.00
Railroad grate bars	11.00 to	11.50
Low phosphorus melting stock, bloom and billet ends, heavy plates, ¾-in. and thicker	17.00 to	17.50
Railroad malleable	13.00 to	13.50
Iron car axles	19.00 to	20.00
Locomotive axles, steel	18.50 to	19.00
Steel car axles	14.50 to	15.00
Cast iron wheels	15.75 to	16.25
Rolled steel wheels	14.00 to	14.50
Machine shop turnings	8.50 to	8.75
Sheet bar crop ends at origin	12.50 to	13.00
Heavy steel axle turnings	10.00 to	10.50
Short shoveling turnings	9.50 to	10.00
Heavy breakable cast	15.00 to	15.50
Stove plate	12.00 to	12.50
Cast iron borings	9.00 to	9.25
No. 1 railroad wrought	12.00 to	13.00

Chicago

CHICAGO, Sept. 13.

Recent changes in market conditions have been slight but favorable. There is a healthy demand for sheets, which is reflected in better mill operations, the local independent having all of its capacity under power. Buying of plates, shapes and bars is still far below normal and prices are weak, although no weaker than heretofore. An advance in wire prices brought out a concentration of orders from widely distributed points, including the South, where the rise in cotton has had a favorable effect on general business conditions.

Additional orders for cars and car repairs are being placed by the railroads and a steady increase in purchases by the carriers is looked for. It is noted that railroad car loadings are growing larger every week and that the monthly deficits of a few months past have been transformed into profits. The net earnings of 202 class one roads in July were the largest for any month since October, 1920, and those of an important Western road in August are reported the largest in history.

The local building outlook looked exceptionally bright last week when Judge Landis, umpire in the dispute between contractors and unions, announced his decision. Various crafts, however, are dissatisfied with the award and the judge, upon being advised that they had struck in violation of their agreement, has denied them a rehearing and employers are preparing to introduce the open shop. Notwithstanding the disturbed local situation, building work is expanding in other sections of the West, numerous good-sized fabricating jobs being in prospect and others having been already placed. An export inquiry for 20,000 tons involved in a bridge over the Yellow River, China, is being figured on by one important Western fabricator, and is expected to be awarded before the end of October.

Foundries throughout this territory are expanding their operations and pig iron is steadily growing stronger, having advanced again to $22, local furnace.

Pig Iron.—The improvement in consumption in this section is gradual but widespread, as indicated by sales to diversified industries, including stove makers, sanitary manufacturers, sewing machine manufacturers, pipe shops, wheel companies, malleable foundries serving both the railroads and the automobile plants, jobbing foundries and others. The only important consumer which has failed to show signs of revival is the agricultural implement industry. The increase in demand has been reflected in another advance in price. The Inland Steel Co., which is operating the only blast furnace producing merchant iron in this territory, advanced its prices on foundry, malleable and basic to $22, base furnace, early last week, and was followed a few days later by the leading Northern merchant. A number of important sales were made on the eve of the advance, among them being 700 tons of foundry bought by a Milwaukee melter, and 500 tons of malleable purchased by a local foundry. A sanitary manufacturer located south of here has bought 600 tons of foundry at $22 base furnace, and sales of from 100 to 300 tons at the new prices are also reported. The American Brake Shoe & Foundry Co., with purchasing office in New York, is inquiring for 8000 tons of iron for its various plants, of which about 1000 tons will go to its Chicago foundries. The advance in Northern iron has materially bettered the chances of Southern iron entering this territory again. A Milwaukee melter, in fact, has issued an inquiry for 1000 tons of Southern foundry. There is now only $3 difference in the Chicago delivered prices of Southern and Northern iron and another advance of $1 a ton by the local producers would permit Southern iron to compete on a parity at various points in this territory, among them certain sections of Illinois, Indiana and Michigan. There is little activity in silvery charcoal or low phosphorus. A Milwaukee melter bought one carload of resale copper bearing low phosphorus at $36, delivered. There is little resale material to be found, however. Beehive foundry coke is growing firmer, the minimum going price being $4.25, Connellsville, with most sellers holding at $4.50.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	$33.50
Northern coke, No. 1, sil. 2.25 to 2.75	22.50
Northern coke, foundry, No. 2, sil. 1.75 to 2.25	22.00
Northern high phos	22.00
Southern foundry, sil. 1.75 to 2.25	25.67
Malleable, not over 2.25 sil	22.00
Basic	22.00
Low phos., Valley furnace, sil. 1 to 2 per cent copper free	$34.50 to 35.50
Silvery, sil. 8 per cent	32.82

Ferroalloys.—A Wisconsin melter has bought 100 tons of ferromanganese at $75 delivered. Two Milwaukee foundries bought a carload each, the price on one being $70, freight allowed, and on the other slightly less than that. A local melter is in the market for one carload. A sale of one car of spiegeleisen is reported at less than $36, delivered. A large Chicago user is inquiring for a car of 50 per cent ferrosilicon and is reported to have been quoted $65, freight allowed. A Milwaukee melter also wants a carload.

We quote 78 to 82 per cent ferromanganese, $70 to $75 delivered; 50 per cent ferrosilicon, $62.50 to $65 delivered; spiegeleisen, 18 to 22 per cent, $36 to $37 delivered.

Railroad Equipment: The Denver & Rio Grande is inquiring for 1000 steel general service cars of either 50- or 70-ton capacity. The Chicago, Rock Island & Pacific has let 200 composite gondola cars of 50-ton capacity to the General American Car Co., and repairs on 125 steel gondola cars to the Western Steel Car & Foundry Co. The Delaware, Lackawanna & Western is inquiring for 1000 steel hopper cars of 50 tons capacity. The Baltimore & Ohio, reported last week as being in the market for 1000 all-steel 50-ton hopper cars and 1000 steel underframe box car bodies, is also asking for figures on the repair of from 3000 to 6000 freight cars of various types. The Toledo, St. Louis & Western has ordered five consolidated type locomotives from the Lima Locomotive Co.

Structural Material.—The long-awaited wage award of Judge Landis, umpire in the local building dispute, was hailed as the harbinger of a period of active construction, but, as explained elsewhere in this issue, subsequent developments indicate that a real settlement has not yet been reached. Dissatisfied with the decision, several crafts have thrown down their tools, holding up work on a number of important construction projects, among them the Chicago Union Station. At the same time the umpire has announced that if either party to the dispute files application for a rehearing, it will be granted. Although local construction has not received the impetus anticipated, there are signs of increased activity in other sections of the West. The amount of work actually let has not yet reached sufficient proportions to affect materially the condition of the mills, and prices on plain material are still decidedly weak. The largest fabricating project in this territory now being figured is the Government airship hangar at Belleville, Ill., involving 3600 tons. One important Western fabricator is preparing a bid on a bridge for the Pekin & Hankow Railroad over the Yellow River, China, and it is reported that this structure will call for 20,000 tons of steel. Recent fabricating awards include:

San Jacinto Life Insurance Building, Beaumont, Tex., 950 tons, to Christopher & Simpson Iron Works.

Riley Creek viaduct, Alaska, 467 tons, to Phoenix Bridge Co.

South Side High School, Fort Wayne, Ind., 400 tons, to the Engineering Co., Fort Wayne.

Tomahawk Steel & Iron Co., foundry and machine shop, Tomahawk, Wis., 143 tons, to Worden-Allen Co.

Consolidated Water Power & Paper Co., power plant, Wisconsin Rapids, Wis., 125 tons, to Worden-Allen Co.

Standard Underground Cable Co., plant at St. Louis, 600 tons, to Decatur Bridge Co.

One hundred shaft sets for Montreal Mining Co., Ironwood, Mich., 130 tons, to Worden-Allen Co.

Pending business includes:

Roosevelt Office Building, Indianapolis, 600 tons, Vonnegut & Bohn of that city, architects.

Terrace Theater, Indianapolis, 150 tons, Vonnegut & Bohn, architects, bids in Sept. 20.

Highway bridge, Sauk City, Wis., 586 tons bids to be at office Wisconsin Highway Commission, Madison, Oct. 7.

Abraham Lincoln High School, Des Moines, Iowa, 800 tons, bids in Sept. 27.

Paul J. Kalman Co., Chicago, warehouse, Youngstown, Ohio, 280 tons.

Consolidated Stone Co., plant Bedford, Ind., 400 tons, to Kenwood Bridge Co.

The mill quotation on plain material ranges from 1.80c. to 1.85c., Chicago. Jobbers quote 2.88c. for materials out of warehouse.

Rail and Track Supplies.—The mills are receiving a fair run of small orders for standard railroad spikes and track bolts, ordinarily ranging from 200 to 1000 kegs. Prices are somewhat confused owing to the fact that some mills are quoting f.o.b. works instead of f.o.b. Pittsburgh, but the ruling market does not appear to exceed 2.40c., Pittsburgh, on spikes and 3.40c., Pittsburgh, on bolts.

Standard Bessemer rails, $45; open-hearth rails, $47; light rails rolled from new steel, 1.75c. f.o.b. makers' mills. Standard railroad spikes, 2.40c., Pittsburgh; track bolts with square nuts, 3.40c., Pittsburgh; tie plates, steel and iron, 2c., f.o.b. makers' mills.

Plates.—This commodity continues weak with the price situation as unsettled as heretofore. The unsatisfactory character of current demand is reflected in intermittent mill operations. One local plate mill was shut down last week and is still inactive. Notwithstanding the present dearth of orders, there are indications of slowly expanding demand, particularly on the part of the car builders and railroads. Inquiries and orders for car repairs as well as for new rolling stock are steadily becoming more numerous and at the same time the railroads are gradually increasing the forces in their own shops. The Chicago, Rock Island & Pacific has ordered 200 composite gondola cars of 50 tons capacity from the General American Car Co., and the steel for this equipment, amounting to 2,000 tons, has been placed with a local mill. A number of large new inquiries for freight cars are noted in another paragraph. Another large project involving plates has been undertaken by an oil company, the Sinclair Crude Oil Purchasing Co. having awarded the fabrication of 2243 tons for 15 oil tanks at Humboldt, Kan., to the Chicago Bridge & Iron Co. This fabricator is reported to have most of the material in stock, so that the letting will not result in a correspondingly large order for the mills.

The ruling mill quotations range from 1.75c. to 1.85c., Chicago. Jobbers quote 2.88c. for plates out of stock.

Bolts and Nuts.—Demand is slack and the market remains exceedingly soft, with nothing resembling stable discounts in sight. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 703.

Jobbers quote structural rivets, 3.68c.; boiler rivets, 3.78c.; machine bolts up to ⅞ x 4 in., 60 per cent off; larger sizes, 55 off; carriage bolts up to ⅞ x 6 in., 55 off; larger sizes, 50 and 5 off; hot pressed nuts, square and hexagon tapped, $3 off; blank nuts, $3.25 off; coach or lag screws, gimlet points, square heads, 60 per cent off. Quantity extras are unchanged.

Bars.—The improvement in the demand for soft steel bars is so gradual that mill output has not yet been materially affected and prices remain unsettled. As low as 1.75c., Chicago, has been done, but 1.85c. and 1.90c. are commoner.

Mill quotations are 2.75c. for No. 28 black, 2.25c. for No. 10 blue annealed and 3.75c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stocks, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c. Hoops and bands, 3.48c.

Sheets.—The demand for sheets continues to expand, with the result that mill operations are on a decidedly improved basis. The mill of the local independent, in fact, is running full. While the prices quoted below are fairly well maintained, there has been some shading, as low as 3.70c. base Pittsburgh, having been done on galvanized, and 2.60c. and 2c., base Pittsburgh, respectively, on black and blue annealed. Such concessions, however, are the exception rather than the rule.

Mill prices are: Mild steel bars, 1.75c. to 1.90c., Chicago; common bar iron, 1.75c., Chicago; rail carbon, 1.75c., mill or Chicago.

Jobbers quote 2.78c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars is 4.20c. for rounds and 4.50c. for flats, square and hexagons. Jobbers quote hard and medium deformed steel bars at 2.53c. base.

Sheet Piling.—An Eastern mill has booked 300 tons of sheet piling for the Belle Isle Bridge, Detroit, and 100 tons for a bridge at Decatur, Ill.

Wire Products.—The American Steel & Wire Co. announced an advance of 15c. on wire nails and barbed wire and of 10c. on plain wire, effective Sept. 10. The new prices have been generally adopted by competitors. Purchases on the eve of the advances were the heaviest this year and buying has been at an accelerated rate since they went into effect. Jobbers who had permitted their stocks to diminish to the vanishing point because they looked for further price reductions are now buying. Those serving agricultural communities are particularly active, indicating a resumption of buying by the farmers. In the South the advance in cotton has been reflected in a marked improvement in business.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, $3.48 per 100 lb.; No. 9 and heavier bright basic wire, $3.63 per 100 lb.; common wire nails, $3.63 per 100 lb.; cement coated nails, $3.05 per keg.

Cast Iron Pipe.—Although the season is growing rather late, there is still a considerable quantity of work in the market. The price situation is substantially unchanged, reports of stiffening heard in some quarters being balanced by low prices named elsewhere. The United States Cast Iron Pipe & Foundry Co. was the only bidder and was awarded 1928 tons of straight 54-in., 241 tons of lugged pipe and 376 tons of special castings by the city of Milwaukee, the price on the straight pipe being approximately $35, Birmingham. Other recent awards include:

Youngstown, Ohio, 850 tons of 4 to 12-in. to National Cast Iron Pipe Co. Bids on about 2000 tons of 12 to 30-in. were rejected.

Cedarburg, Wis., 600 tons, to American Cast Iron Pipe Co.

Troy, Ohio, 150 tons, to National Cast Iron Pipe Co.

Chicago, 255 tons, to United States Cast Iron Pipe & Foundry Co.

Prospective business includes:

Spring Wells, Mich., 450 tons, bids to be in Sept. 13.

Springfield, Ill., 250 tons, Sept. 19.

Forest, Ohio, 300 tons, Sept. 16.

Decatur, Ill., 400 tons, Sept. 12, to be let to contractor who will sublet.

We quote per net ton, f.o.b. Chicago, ex-war tax, as follows: Water pipe, 4-in., $45.60 to $48.60; 6-in. and above, $42.60 to $45.60; class A and gas pipe, $3 extra.

Old Material.—Aside from a few scattered purchases by gray iron and malleable foundries, the market has been quiet so far as consumptive demand is concerned. Most users still refuse to consider recent advances as permanent and dealers are unwilling to make concessions. There have been few changes in the prices at which sellers are holding their material, but such changes as have taken place have been principally upward. Railroad offerings include: Northern Pacific, 2000 tons; Santa Fe, 1500 tons, and Soo Line, 500 tons.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	$16.00 to $16.50
Relaying rails	27.50 to 30.00
Car wheels	14.00 to 14.50
Steel rails, rerolling	13.00 to 13.50
Steel rails, less than 3 ft.	12.50 to 13.00
Heavy melting steel	11.00 to 11.50
Frogs, switches and guards cut apart	11.00 to 11.50
Shoveling steel	10.50 to 11.00
Low phos. heavy melting steel	13.25 to 13.75
Drop forge flashings	7.00 to 7.50
Hydraulic compressed sheet	7.50 to 8.00
Axle turnings	8.00 to 8.50
Per Net Ton	
Iron angles and splice bars	14.00 to 14.50
Steel angle bars	10.50 to 11.00
Iron arch bars and transoms	14.50 to 15.00
Iron car axles	18.50 to 19.00
Steel car axles	13.50 to 14.00
No. 1 busheling	9.00 to 9.50
No. 2 busheling	6.25 to 6.75
Cut forge	10.00 to 10.50
Pipes and flues	7.00 to 7.50
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	10.00 to 10.50
Steel knuckles and couplers	11.50 to 12.00
Coil springs	13.00 to 13.50
No. 1 machinery cast	13.50 to 14.00
No. 1 railroad cast	13.00 to 13.50
Low phos. punchings	11.50 to 12.00
Locomotive tires, smooth	11.00 to 11.50
Machine shop turnings	3.50 to 4.00
Cast borings	5.00 to 5.50
Stove plate	12.50 to 13.00
Grate bars	10.50 to 11.00
Brake shoes	11.00 to 11.50
Railroad malleable	13.00 to 13.50
Agricultural malleable	13.00 to 13.50
Country mixed	8.50 to 9.00

New York

NEW YORK, Sept. 13.

Pig Iron.—Inquiries which have developed during the past 10 days amount to about 17,000 tons of foundry and malleable iron. Though very little of this tonnage has been placed, it is confidently expected that contracts amounting to 10,000 tons will be made within a few days. The most interesting transaction was that of a Dover, N. J., melter who inquired for 1000 to 1500 tons for first quarter delivery and compromised with the seller, placing the order for deliveries starting in December and extending over January and February only. Inquiries from hardware interests amount to about 1400 tons, including 400 tons for the first quarter of 1922. No furnaces seem anxious to quote for delivery after Jan. 1, but some will sell for January-February delivery as in the case of the Dover buyer. The market is firmer and $19.50, furnace, seems to be minimum in eastern Pennsylvania for No. 2 plain, while No. 1X is now quoted $1 higher than No. 2X, showing that shading on high silicon iron is not being continued. Furnace operators point to the higher price of coke as one of the indications that the cost of making pig iron will not be lowered by reduced cost of raw material at any time in the near future The price of coke is, however, affected by strikes which may soon end. There is some evidence of increasing melt and foundrymen are showing decidedly more interest in the market.

We quote delivered in the New York district as follows, having added to furnace prices $2.52 freight from eastern Pennsylvania, $5.46 from Buffalo and $6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25..	$23.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	22.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25..	22.02
Buffalo, sil. 1.75 to 2.25.....	25.46
No. 2 Virginia, sil. 1.75 to 2.25 (nom.)	28.16 to 29.16

Ferroalloys.—At least one British producer has today reduced its quotation for standard British ferromanganese from $65 to $58.35, seaboard. This value corresponds quite closely to the British official quotation of £14 10s. for export of this alloy to continental Europe at the present rate of exchange and adding the freight rate to this country. Inquiries consist of several lots of 100 to 200 tons, aggregating about 500 tons, as well as a few smaller lots, but no sales are reported. Inquiry for spiegeleisen is light and sales are few at the prevailing quotations. The market for high grade manganese ore continues lifeless with quotations nominal. Demand for 50 per cent ferrosilicon is small at prevailing prices. We quote as follows:

Ferroalloys

Ferromanganese, domestic, delivered, per ton	$70.00
Ferromanganese, British, seaboard, per ton.	$58.35
Spiegeleisen, 20 per cent, furnace, per ton.	$25.00 to $26.00
Ferrosilicon, 50 per cent, delivered, per ton.	$60.00 to $65.00
Ferrotungsten, per lb. of contained metal..	48c. to 58c.
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr.....	14c.
Ferrovanadium, per lb. of contained vanadium	$4.50

Ores

Manganese ore, foreign, per unit, seaboard..	20c.
Tungsten ore, per unit, in 60 per cent concentrates	$3.00 up
Chrome ore, 40 to 45 per cent Cr_2O_3, crude, per net ton, Atlantic seaboard.....$20.00 to	$25.00
Chrome ore, 45 to 50 per cent Cr_2O_3, crude, per net ton, Atlantic seaboard.....	$30.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS_2, New York.....55c. to	60c.

Cast-Iron Pipe.—There has been a flurry of municipal askings and purchases, which has brought out low prices in case of attractive tonnages. For instance, the City of New York opened bids for 1200 tons of 16-in. and 20-in. pipe, the Florence Foundry & Machine Co. bidding lowest at $41.70, delivered. Boonton, N. J., purchased 100 tons of 12-in. pipe from the R. D. Wood Co., Philadelphia. Essex Fells, N. J., has awarded the job of furnishing and laying 100 tons to a contractor. We quote per net ton, f.o.b. New York, carload lots, as follows: 6-in. and larger, $47.30; 4-in. and 5-in., $52.30; 3-in., $62.30, with $4 additional for Class A and gas pipe.

Finished Iron and Steel.—The week has brought a noticeable improvement in demand, particularly in structural shapes, bars and wire products. Plates, sheets, cold finished bars and some other forms of steel are still dull and featureless. The advance of $2 and $3 a ton on wire products by the American Steel & Wire Co., followed by its competitors, constitutes the strong feature of the steel price situation. Other products are soft and the measure of the decline which has quietly taken place in recent weeks is shown by open bids received up to Sept. 10 by the New York Central Railroad on 1000 tons of plates, shapes and bars. Nearly all of the mills which make all three products put in bids. On steel bars the Carnegie Steel Co. and some of the other independents bid 1.65c., Pittsburgh, but Buffalo companies bid 1.65c., Buffalo. On plates the bids ranged from 2.03c., delivered New York, which works back to 1.65c., Pittsburgh, to 1.75c., Pittsburgh, while on structural shapes most of the bids ranged from 1.70c. to 1.80c., Pittsburgh. One of the indications of a better tone in the steel trade was the placing of a 3000-ton stock order for shapes, plates and bars by a fabricating company, there having been little of such business of this character for more than a year. The price advance on wire products brought out a fairly good volume of business, many jobbers closing on 60-day contracts at the former prices and taking immediate delivery of part of their requirements. Though most of the current improvement is in domestic trade, there is also a slight spotty betterment in export demand. Following the shipment last week of 3000 tons of skelp to Scotland, a leading independent export seller received an inquiry from England for 2700 tons of skelp and plates. Bar business is made better by an increasing number of building jobs. Inquiries for reinforcing bars totaling several thousand tons are pending. The Donner Steel Co., Buffalo, last week started four open-hearth furnaces, and its 10-in. and 14-in. bar mills are in part engaged in rolling orders for a new deformed bar which it has placed on the market. Outside of the 15,000 tons involved in the Federal Reserve Bank Building, New York, the week in fabricated steel has been quiet. For the Federal Reserve Bank six bids in all were received, and while it is understood the contract has been let, announcement is as yet withheld. Among new projects may be mentioned a plant which the Lamson Store Service Co. is planning to build at Syracuse, taking 400 tons, and the George A. Fuller Co. is reported to have the general contract for a building to occupy the Park Avenue frontage of the old Grand Union Hotel site at Forty-second Street.

Awards include a building in New York for the Dodge Sales & Engineering Co., Mishawaka, Ind., 1500 tons, to the Hay Foundry & Iron Works, and the Excelsior Savings Bank Building, New York, 600 tons, to the Hedden Iron Construction Co. The Western Steel Car & Foundry Co. will do the repairs on 125 general service cars for the Rock Island and has been awarded the repairs on 250 hopper cars for the Wabash.

We quote for mill shipments, New York, as follows: Soft steel bars, 2.03c.; plates, 2.03c. to 2.08c.; structural shapes, 2.03c. to 2.18c.; bar iron, 1.98c. to 2.03c. On export shipments the freight rate is now 28.5c. per 100 lb., instead of 38c., the domestic rate.

Warehouse Business.—August sales by warehouses showed a general improvement, which is evidently continuing. Prices are weak, due to the uncertainty of mill quotations. It is reported that sales of steel bars have been made by a warehouse in this district at 2.68c. per lb., 10c. per 100-lb. below the prevailing quotation. Sheet prices continue to show a slight decline, galvanized, No. 28 gage being obtainable as low as 4.75c. per lb., black sheets at 4c. per lb. and blue annealed, No. 10 gage, at 3.28c. per lb. While most warehouses handling wire quote bright basic and annealed soft at 3.75c. per lb., a large independent interest still maintains its prices of 3.53c. and 3.38c. per lb. Although we quote Swedish iron bars at 10c. per lb., there is no market on this material, and any quotation is nominal. Discounts on wrought iron pipe have been increased proportionate to the recent mill reduction. We quote prices on page 718.

High Speed Steel.—Business is better, most sellers reporting considerable increase of sales in August over the July business. Quotations on 18 per cent tungsten high speed steel are maintained at about 90c. to $1 per lb.

Coke.—Prices have risen about 25c. the past week, the lowest price of guaranteed foundry coke being $4.25 per ton, Connellsville, and this price is not shaded. The range extends to $4.50. A sale of furnace coke has just been consummated of 7000 tons a month during last quarter for $3.50, Connellsville, base. Many report better business in coke than in pig iron. The strikes of oven operators is a reason assigned to the rising prices.

Old Material.—The advance in prices was more pronounced the past week, several items having risen about $1. No more mills appear to be in the market, the advancing prices being caused by the efforts of dealers to lay down material in yards and of brokers and dealers to cover on old orders. Heavy melting steel, pipe and stove plate continue to be most in demand.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard	$7.00 to $7.50
Heavy melting steel, rails or equivalent	8.50 to 9.00
Rerolling rails	11.50 to 12.00
Relaying rails, nominal	37.50 to 40.00
Steel car axles	11.00 to 11.50
Iron car axles	18.00 to 19.00
No. 1 railroad wrought	11.50 to 12.00
Wrought iron track	9.00 to 9.50
Forge fire	5.50 to 6.00
No. 1 yard wrought, long	9.50 to 10.00
Light iron	3.50 to 4.00
Cast borings (clean)	5.50 to 6.00
Machine-shop turnings	3.50 to 4.00
Mixed borings and turnings	3.00 to 3.50
Iron and steel pipe (1 in. diam. not under 2 ft. long)	8.50 to 9.00
Stove plate	9.50 to 10.00
Locomotive grate bars	9.50 to 10.00
Malleable cast (railroad)	8.50 to 9.00
Car wheels	11.00 to 11.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast	$16.00 to $17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	15.00 to 16.00
No. 1 heavy cast, not cupola size	14.00 to 15.00
No. 2 cast (radiators, cast boilers, etc.)	9.50 to 10.50

Birmingham

BIRMINGHAM, ALA., Sept. 13.

Pig Iron—The question now is how long the $19 base for Birmingham iron will last, for it is expected to advance. No business was done under the $19 base last week. No silicons were sacrificed. The leading maker declined to sell 2.25 to 2.75 silicon in round lots at $19. Only one concern has well-assorted stocks. Eight have little or none. The Central Iron & Coal Co. will resume at its blast furnace at Holt Sept. 19 and at its principal coal mines Sept. 26. Forty of the 60 by-product ovens have started and will again supply the city of Tuscaloosa with fuel and light. The company has not a ton of iron on hand. The Alabama Co. has resumed at one ore mine and schedules furnace resumption in October. Stove plants are taking more metal. The largest foundry interest reports a larger outgo than in months and a greater influx of orders. No especially large tonnage has been booked in a single order, but the aggregate of the week must have been 10,000 tons. The rise in cotton has inspired and stimulated the entire South and all business has responded promptly without exception. It is believed that the Southern Wheel Co. has closed a deal for 2900 tons of pig iron in three grades running from base to 3.25 per cent silicon for the Southern plants at Birmingham, Atlanta and Savannah, although the seller cannot be positively located. The price quoted by Birmingham makers on all grades was the base of $19 for 1.75 to 2.25. Some Birmingham makers believe a portion of order was placed at St. Louis.

We quote per gross ton f.o.b. Birmingham district furnace, as follows:

Foundry, sil. 1.75 to 2.25	$19.00
Basic	18.00
Charcoal	35.00

Cast Iron Pipe—A large sanitary pipe interest shipped the greatest amount of pipe in August in the history of its business. Much extra heavy pipe has gone to the East. The base remains at $40 for standard and $30 for extra heavy. Business is fair to good. The base of high pressure pipe seems to remain at $35 for 6-in. with shading on larger sizes. The Birmingham Water Works is taking a considerable tonnage of 30-in. and 16-in. pipe. Very little is moving to the Pacific Coast this month following 7000 tons last month. Many Southwestern cities are on the eve of ordering and will as soon as they can sell bonds.

Finishing Mills—Finishing steel mills in Birmingham continue to operate on an enlarged schedule. The Gulf States Steel Co. was on 55 per cent in August and is at the same pace now. The Tennessee company maintains a more than 60 per cent schedule with following plants active: Rail mill (9000 tons a week), structural mill at Fairfield, plate mill at Bessemer, car works, tie-plate plant, four furnaces on basic, six of its nine open hearth furnaces.

Coal and Coke—Coal is being mined at 70 per cent of normal and standard foundry coke is fairly active at $6 to $6.50.

Old Material—No. 1 heavy steel is firmer and up $1 with other materials tending upward, but no change in quotations last week. Cast scrap is quite active.

We quote per gross ton f.o.b. Birmingham district yard as follows:

Steel rails	$11.00 to $12.00
No. 1 steel	10.00 to 11.00
No. 1 cast	15.00 to 16.00
Car wheels	15.00 to 16.00
Tramcar wheels	12.00 to 13.00
No. 1 wrought	13.00 to 14.00
Stove plate	9.00 to 10.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	6.00 to 7.00

Boston

BOSTON, Sept. 13.

Pig Iron.—Eastern Pennsylvania iron appears easier in spots, although in all fairness it should be stated not enough has been sold at lower prices to establish the market. The Robesonia furnace is credited with offering No. 2 plain at $19, No. 2X at $19.50 and No. 1X at $20. The Gurney Heater Mfg. Co., South Framingham, Mass., this week purchased 600 tons No. 2 plain at an indicated delivered price of slightly better than $23.50. A week ago, eastern Pennsylvania generally was quoted at $20 furnace, base. Two 100 ton lots were taken this week on a basis of $20, furnace, for No. 2X and $21 for No. 1X. A New England malleable interest purchased 100 tons Northern special analysis iron at practically $25.50, delivered. Otherwise business was confined to scattered car-lots of Buffalo and eastern Pennsylvania, mostly silicons 2.75 to 3.25 and 4.25 to 4.75 at prices having varying relations to base quotations, the tendency being to shade regular 50c. differentials. Slight improvement is noted in the call for car-lots of Southern special analysis iron from manufacturers' foundries, willing to pay the difference between these and Pennsylvania and Buffalo to secure desired mixtures, on a basis of $19 furnace for No. 2 plain with 50c. differentials. Virginia iron appears weaker without actual transactions. Some inquiry is noted for first quarter, 1922 iron, but no furnace is willing to quote for that delivery. Delivered pig iron prices follow:

East. Penn., sil. 2.25 to 2.75	$24.06 to $25.06
East. Penn., sil. 1.75 to 2.25	23.56 to 24.56
Buffalo, sil. 2.25 to 2.75	25.46 to 26.46
Buffalo, sil. 1.75 to 2.25	25.46 to 25.96
Virginia, sil. 2.25 to 2.75	29.08 to 32.08
Virginia, sil. 1.75 to 2.25	28.58 to 31.58
Alabama, sil. 2.25 to 2.75	30.16
Alabama, sil. 1.75 to 2.25	29.66

Coke.—Foundry orders for winter supplies of coke have begun to make their appearance, but these are not sufficient in number to materially influence the daily output of the New England by-product producers. A large percentage of the foundries, especially the jobbing, have small stocks of fuel on hand and are buying only as absolute necessity requires. The outlook for increased meltings is not sufficiently bright at the moment to indicate a change in their coke buying policy. There is not enough prospective business from day to day to attract outside foundry coke interests to this market. Local producers continue to quote both spot and contract by-product foundry coke at $10.66 delivered.

Finished Materials.—Some fairly attractive tonnages of angles, plates and shapes are hanging over the market, for which mill representatives are quoting 1.65c. f.o.b. Pittsburgh. The market on wire nails is slightly more active, following advices from producers

to cover before the advances. That for other mill products has grown less active. Prices consequently appear firmer simply because there is less opportunity to quote. Jobbing house business is spotty, some concerns reporting greater consumption, while others say business is no more than holding its own. Sentiment regarding fall trade, however, generally is more hopeful among the jobbing interests.

Jobbers now quote: Soft steel bars, $2.81½ per 100 lb. base; flats, $3.83 to $3.93; concrete bars, $2.50 to $3.09; tire steel, $4.20 to $4.70; spring steel, open hearth, $5.25; crucible, $11.50; steel bands, $3.46½ to $3.98; steel hoops, $4.18; toe calk steel, $5.25; cold rolled steel, $4.15 to $4.65; structural steel, $2.81½ to $2.96½; plates, $2.91½ to $3.10; No. 10 blue annealed sheets, $3.73; No. 28 black sheets, $4.75; No. 28 galvanized sheets, $5.25; refined iron, $2.83 to $4.75; best refined, $4.75; Wayne iron, $7; Norway iron round, ¼-in. to 2½-in., 7.10c. per lb. net; other sizes, 7.75c. base.

Old Material.—The limited buying of No. 2 plain pig iron the past two or three months and the more frequent calls for ground ferromanganese, suggests jobbing foundries are using larger percentages of machinery cast per melt than has been common practice heretofore. Old material brokers, on the other hand, as a rule secure only scattered car-lot orders. The inference is that foundries, with their limited weekly meltings, are securing all scrap needed from local junk dealers. Manufacturers' foundries occasionally come into the market for 100 or 200 tons, a textile machinery maker this week having purchased 100 tons textile scrap at $18 delivered, while another manufacturing interest asked quotations on 150 to 200 tons. There is no concerted buying movement on their part, however. Machinery cast prices take a wide range according to the quality of holdings, but in all instances are firmly held and, if anything, have an upward tendency. Pennsylvania steel mills apparently are not willing to raise bids on heavy melting steel, etc., and yard interests will not meet their prices, consequently the market continues in a deadlock.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	$17.00 to $20.00
No. 2 machinery cast	15.00 to 16.00
Stove plate	15.00 to 15.50
Railroad malleable	11.50 to 12.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$6.00 to $6.50
No. 1 railroad wrought	9.00 to 9.50
No. 1 yard wrought	7.50 to 8.00
Wrought pipe (1 in. in diameter, over 2 ft. long)	7.50 to 8.50
Machine shop turnings	2.00 to 2.50
Cast iron borings, rolling mill	3.50 to 4.00
Cast iron borings, chemical	4.00 to 4.50
Blast furnace borings and turnings	2.00 to 2.50
Forged scrap and bundled skeleton	4.00 to 4.50
Street car axles and shafting	12.00 to 12.50
Car wheels	11.50 to 12.50
Rerolling rails	9.00 to 10.00

Cleveland

CLEVELAND, Sept. 12.

Iron Ore.—Two inquiries have come out, each for 10,000 to 15,000 tons of high phosphorus ore, on which sellers have quoted $5.35, the regular price for this ore this season, the price being 35c. below regular base on old range non-Bessemer. Furnaces claim, however, that they cannot make pig iron to sell at current prices unless they are able to buy ore at lower prices. With the large ore stocks on hand, it is believed that a furnace would have little difficulty in buying ore on dock at lower than regular prices. One steel plant having long time contracts for ore will require 30,000 tons more ore than it originally specified and this week placed an order for that additional amount. Ore receipts at Lake Erie ports during August were 3,158,447 gross tons as compared with 7,095,450 tons during August last year. Receipts at Lake Erie ports for the season till Sept. 1 were 10,407,882 tons as compared with 24,503,222 tons during the same period last year. August shipments from Lake Erie ports to inland furnaces were 2,135,104 tons as compared with 5,029,207 tons in August, 1920, and the shipments from these docks for the season till Sept. 1 were 7,842,336 tons as compared with 17,626,216 tons till Sept. 1 last year. In spite of the light ore movement this year, stocks on docks are considerably larger than a year ago, the amount on Lake Erie docks Sept. 1 being 9,285,708 tons as compared with 8,554,455 tons on the same date a year ago. August receipts at other than Lake Erie ports were 1,190,454 tons as compared with 2,159,686 tons during August, 1920. The same ports have received 3,659,097 tons this season as compared with 9,226,168 tons up to September, 1920.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, $6.45; Old range non-Bessemer, 51½ per cent iron, $5.70; Mesabi Bessemer, 55 per cent iron, $6.20; Mesabi non-Bessemer, 51½ per cent iron, $5.55.

Pig Iron.—Sales during the past week, while mostly in small lots, indicate a broadening demand for pig iron and the market shows a further stiffening of prices toward the $21 quotation on this grade. While the $20 quotation is still being made by some lake furnaces, more business is being taken at from $20.50 to $21, so that the average price at which sales were made was advanced somewhat during the week. One Valley furnace made a number of small lot sales at $21, which it has adhered to recently, and the agency making these sales sold in all about 4000 tons during the week from various furnaces. Another interest that has been on a $20 basis at its several furnaces is now asking $21 for foundry iron and its sales include a small lot from a New York furnace at that price, f.o.b. Buffalo. Another interest sold 4000 tons during the week in small lots of foundry and including some malleable iron at $20 to $21. Locally the price remains at $20.50 to $21 at furnace, although one producer is now asking $22, delivered, basing this price on $21 Valley iron and giving the buyer the advantage of one-half of the freight rate. A local consumer has purchased 1000 tons of malleable iron and this sale is of particular interest in that the iron is for delivery until March 1. This is the first sale reported in many months for extended future delivery and while the price has not been announced it is understood that the buyer paid a little more for the iron than he would have been charged had he bought it for earlier shipment. An inquiry for 400 tons of foundry iron for the fourth quarter came out and brought a $21 quotation, but was withdrawn. Basic iron can still probably be bought at $19 from steel makers, although most merchant furnaces are asking $20. On an inquiry for 1000 tons of basic iron from a Pittsburgh district consumer, a Cleveland furnace during the week quoted $20 Valley, but did not get the order. We note the sale of a car lot of low phosphorus iron at $35, or $1 a ton lower than recent quotations.

We quote delivered Cleveland as follows, based on the new freight rate, there being a 56c. switching charge for local iron, a $1.96 freight rate from Valley points, a $3.36 rate from Jackson and $6.67 from Birmingham:

Basic	$20.96
Northern No. 2 fdy., sil. 1.75 to 2.25	$20.50 to 21.00
Southern fdy., sil. 2.25 to 2.75	26.17
Ohio silvery, sil. 8 per cent	30.86
Standard low phos., Valley furnace	35.00

Alloy Steel.—Recent price reductions by some of the automobile builders upset production schedules and caused hesitancy in placing pending orders for alloy steels. Prices are weak and down close to the pre-war base. Mills quote 3½ per cent nickel steel at 5c. to 5¼c. per lb., chrome nickel steel at 4½c. to 4¾c. and chrome vanadium steel at 5c. to 5¼c., the lower prices being for desirable orders.

Hot and Cold-Rolled Strip Steel.—The market is rather quiet and prices are somewhat irregular. On desirable orders, mills quote hot-rolled strip steel at 2.10c. to 2.15c. and cold-rolled strip steel at 4c.

Bolts, Nuts and Rivets.—The demand for bolts and nuts continues to improve and local makers report prices a little firmer. Consumers are buying in somewhat larger quantities than they have been and a few have placed contracts for the remainder of the year. Orders are coming from jobbers and from about all classes of consumers except the implement manufacturers. The demand for rivets has improved slightly, but is still very light. Prices are weak and irregular with 2.25c. and 2.35c. the minimum quotations for structural and boiler rivets respectively.

Semi-Finished Steel.—There is a moderate demand for sheet bars in small lots and one mill reports sales during the week aggregating 2800 tons. The going price is $30, Youngstown. Since the recent $2 reduction in sheet bars, mills are not inclined to allow the $1 differential on slabs, which are also quoted at $30.

Finished Iron and Steel.—The volume of business changed very little during the week, although some of

the mills report a slight increase in orders and inquiries. The price advance on nails and wire caused a feeling among some customers that prices on other items may have reached bottom and the market might stiffen. However, steel bars, plates and structural material are still weak with average prices probably a little lower than a week ago. Although minimum quotations generally are unchanged, a new low price has appeared on steel bars. Independent mills have followed the American Steel & Wire Co. in advancing prices on nails, wire and wire rods, but before the advance the mills gave their customers an opportunity to cover at the lower prices and booked considerable wire tonnage. Sheet bars are commonly quoted at 1.65c. for car lots, but sales have been made at 1.60c., and even that quotation has been shaded. Plates are generally quoted at 1.65c. to 1.70c., the lower price being fairly common for a desirable order, and some sales are being made at 1.75c., but it is very probable that a good order would bring out a 1.60c. quotation. On structural material, 1.65c. is apparently the minimum quotation. A Cleveland mill which was reported last week to have taken 1000 tons of plates from an Eastern consumer has booked another 1000-ton order from the same source for oil tanks and stills. Lake shipyards are figuring on a 400-foot stone and coal boat requiring 2500 tons of plates and structural material. This is the first definite inquiry for a large freight boat that has reached these shipyards this season. Another inquiry is for 1000 tons of cold-rolled steel bars. The demand for steel from the automobile industry in Detroit is falling off. Car builders are evidently reducing their stock in anticipation of a slackening in sales during the fall. Mills supplying the Ford Motor Co. advise that this company will not buy as much steel for October requirements as it did for September, although it is stated that this company has not yet reduced production. Structural work is inactive. Hard steel bars are quoted with prices slightly lower, ranging from 1.60c. to 1.65c.

Jobbers quote steel bars, 2.64c.; plates and structural shapes, 2.74c.; No. 9 galvanized wire, 3.50c.; No. 9 annealed wire, 3.25c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 3.29c.; cold-rolled rounds, 3.85c.; flats, squares and hexagons, 4.35c.

Sheets.—Shading to the extent of $1 a ton to 2.20c. is being done on blue annealed sheets, several orders being taken at that price. Black and galvanized sheets are apparently firm at 2.75c. and 3.75c. respectively. Some of the mills are now charging for certain extras that they have been waiving. Orders have fallen off somewhat. A Cleveland mill has taken 750 tons of No. 30 gage black sheets for Japan.

Warehouse Business.—Warehouses have reduced prices $5 a ton on black sheets and will make an advance on nails and wire corresponding to the advance in mill prices.

Old Material.—There is some demand for scrap for shipment to Valley and other mills. This is largely from dealers who have recently taken contracts and the activity is confined to heavy melting steel, borings, turnings and compressed steel. These grades are moving at $13 to $13.50 for heavy melting steel, $8.50 for shoveling turnings and cast iron borings and $10 to $10.50 for compressed steel. For Canton delivery, dealers are offering $12.50 for heavy melting steel. There is no demand from local mills. Prices are firm and unchanged.

We quote per gross ton delivered consumers' yards in Cleveland and vicinity as follows:

Heavy melting steel	$12.25 to $12.75
Steel rails under 3 ft.	12.75 to 13.25
Steel rails, rerolling	14.25 to 14.75
Iron rails	11.00 to 12.00
Iron car axles	18.00 to 19.00
Low phosphorus melting scrap	12.50 to 13.00
Cast borings	7.25 to 7.75
Machine shop turnings	6.00 to 6.50
Mixed borings and short turnings	7.00 to 7.50
Compressed steel	8.00 to 8.25
Railroad wrought	12.00 to 12.50
Railroad malleable	12.00 to 12.75
Light bundled sheet stampings	4.50 to 5.00
Steel axle turnings	9.25 to 9.75
No. 1 cast	16.00 to 16.50
No. 1 busheling	7.50 to 8.00
Drop forge flashings, over 10 in.	5.50 to 6.00
Drop forge flashings, under 10 in.	6.00 to 6.50
Railroad grate bars	12.75 to 13.00
Stove plate	13.00 to 13.25
Pipes and flues	6.50 to 7.50

Cincinnati

CINCINNATI, Sept. 13.

Pig Iron.—The market was comparatively quiet during the week, though several 100-ton lots were disposed of. Carload business has again become the prevailing activity. A few inquiries, the largest of which is for 400 tons, are being figured on, the bulk of the business coming from Indiana melters. The price situation is firm, southern Ohio irons having advanced during the week $1 a ton to a $21 base, for foundry and malleable. We note a sale of 200 tons of malleable from southern Ohio at the latter figure, and one of 800 tons of foundry iron to a St. Louis district melter at the same figure. Several carload sales of Southern irons were made on the basis of $19, Birmingham, but in one instance $19.50 was secured. The general asking price, however, is $19, and it is reported that a Southern railroad equipment company purchased 6000 tons at this figure. A sale of 100 tons of Chicago iron at $22 was made to a northern Indiana melter. While the week just closed was quiet, the trade is confident that better things are in sight, and preparations are being made to blow in several furnaces. One Marting stack in southern Ohio will go in blast on Thursday, and Tuscaloosa and Etowah in the South are scheduled to resume about Oct. 1.

Based on freight rates of $4.50 from Birmingham and $2.52 from Ironton we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	$23.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	24.00
Ohio silvery, 8 per cent sil.	30.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	23.52
Basic, Northern	22.52
Malleable	23.52

Finished Materials.—The feature of the week was the announcement by the American Steel & Wire Co. of an advance of 15c. per keg on wire nails, 15c. per 100 lb. on barbed wire, 10c. per 100 lb. on plain wire, and approximately $4 per ton on wire rods. It has long been felt by the trade that wire nails and wire products were being sold at prices that eliminated any possibility of the mills securing a profit, but the advance, while expected at some time, nevertheless comes as somewhat of a surprise. At any rate, the announcement was the means of bringing out a fair volume of business, and several orders for 10,000 kegs of nails were placed at the old price of $2.75 per keg. The same condition holds in other products, it being estimated that 20 carloads of wire products were placed before the advanced prices went into effect. In other lines of finished materials, with the exception of sheets, business has been rather quiet. The sheet market is fairly active, and numerous carload orders are being booked for immediate delivery, many of these for shipment to the South, which is, in the opinion of a number of salesmen covering the territory, showing a steady, though somewhat slow, recovery from the business depression. Recent advances in the price of cotton have had a stimulating effect on all lines of business, and confidence in the future is rapidly being restored. While reports are heard that prices on finished material are being shaded, the last published prices are apparently holding on business booked in this territory. For instance, we note a sale of a carload of steel bars at 1.75c., and about 60 tons of shapes and plates at 1.80c. On reinforcing bars, 1.60c. is apparently a general quotation, with a price of 1.55c. reported on an inquiry for 300 tons. In the structural field, the American Bridge Co. was low bidder on 15 barges for Memphis, the tonnage involved consisting of 1400 tons of plates. The same company was low bidder on 200 tons of steel work for Ohio River dams, and the Pittsburgh Trolley & Forge Co. on 100 tons of similar work. Cincinnati Council, Knights of Columbus, are planning the erection of a 10-story club house, and plans for the Masonic Temple will likely be posted shortly. Plans are also posted here for a bridge at Cairo, Ill., to be erected by the Illinois Central Railroad.

Warehouse Business.—Jobbers of wire products report business as steadily increasing, the demand for wire nails and barbed wire being heavy the past week.

The orders for other products, while small, are more in number, and tonnages are increasing slightly. While there have been no further price changes, it is anticipated that one will be made within the next week or so, or as soon as the price situation at the mills becomes more stable. The announcement by the American Steel & Wire Co. of price advances on nails and wire products was received with much interest by local jobbers. It is expected that stiffening of warehouse prices will be noticed, as local stocks are not heavy.

Iron and steel bars, 3c. base; hoops and bands, 3.75c. base; shapes, 2.85c. base; plates, 2.85c. base; reinforcing bars, 3.07½c. base; cold rolled rounds, 1½ in. and larger, 4.25c.; under 1½ in. and flats, squares and hexagons, 4.75c.; No. 10 blue annealed sheets, 3.50c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, $3.25 per keg base; No. 9 annealed wire, $3.00 per 100 lb.

Coke.—A better movement in coke is reported, though inquiries are not large. Much of the business being done is in foundry coke for immediate shipment. Prices are firm and operators are not inclined to contract for the future. Some additional ovens are being lighted in the West Virginia field, one operator having added 50 within the past two weeks.

Old Material—Some inquiries are being received for No. 1 machinery cast which is reported to be very scarce. There is very little activity, however, in the scrap market and prices, while firmer, as quotably unchanged.

We quote dealers' buying prices:

Per Gross Ton		
Bundled sheets	$4.00 to	$5.00
Iron rails	12.00 to	12.50
Relaying rails, 50 lb. and up	25.00 to	26.00
Rerolling steel rails	10.50 to	11.50
Heavy melting steel	9.00 to	9.50
Steel rails for melting	9.00 to	10.00
Car wheels	11.50 to	12.50
Per Net Ton		
No. 1 railroad wrought	8.50 to	9.50
Cast borings	2.50 to	3.00
Steel turnings	2.00 to	2.50
Railroad cast	12.00 to	12.50
No. 1 machinery	12.50 to	13.50
Burnt scrap	7.00 to	8.00
Iron axles	15.00 to	16.00
Locomotive tires (smooth inside)	9.50 to	10.00
Pipes and flues	4.00 to	5.00

Buffalo

BUFFALO, Sept. 13.

Pig Iron.—The Rogers Brown Iron Co. blew in a furnace Sept. 8, stocks having been considerably reduced recently. This is the first blast furnace operation by this interest since the winter. Less than 10,000 tons of iron has been sold in the district, but inquiry has improved in an encouraging way. One interest has total inquiry of almost 20,000 tons, of which two separate propositions are for 2000 tons each. The lowest price is $20 for No. 2 plain and an effort is being made to maintain differentials on the various silicons ranging from $20 to $23. Another producer sold less than 2000 tons at $20 and $21 and reports a falling off in inquiry since the Buffalo market showed a strengthening. With a majority of producers, business is limited to small quantities; one sold a few hundred tons of malleable and another about 300 tons of foundry iron at $20.50. There is evidence that little iron is in the hands of brokers. One furnace having a stack in operation on foundry iron throughout the dull period will go on basic production to fill its own needs and on this basis will operate all month. The company expects its stock of foundry iron will be exhausted before Oct. 1 and if the volume of business is maintained, may blow in a furnace before that date. Its sales for a week were 5000 tons and with the exception of two lots of 1000 tons each and two for 500 tons, the sales were for carload quantities.

We quote f.o.b. dealers' asking prices per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil	$21.75
No. 2X foundry, 2.25 to 2.75 sil	20.75
No. 2 plain, 1.75 to 2.25 sil	20.00
Basic (nominal)	21.00
Malleable (nominal)	22.00
Lake Superior charcoal	33.75

Finished Iron and Steel.—Before the advance in wire prices became effective, some desirable business in various grades was closed by a local mill. The tonnage is in the neighborhood of 4000 and is made up of three orders. The advances of the American Steel & Wire Co. will be followed by local mills. Bar inquiry and in particular for reinforcing material has brightened. One bar inquiry is for 500 tons—larger than has been received here in some time. Sheet piling for the Detroit-Belle Isle Bridge has been purchased here from a mill, but figures as to prices and quantity are not available. Rail business has dropped to nothing; whatever contracts are made for rails within the remainder of this year will be for delivery next year, mills expect. Pipe business continues good and some better activity in tin plate is noticed, some buyers desiring to contract on a 60-day basis. Sheet and bar orders are light. Structural work on enterprises of any size is apathetic in contrast to unusual activity in construction business on small buildings. An order for a carload of bolts and nuts was placed with a local agency on which keen competition was met, but the price was not made known. Some fair galvanized sheet orders have appeared, but the same office receiving this business finds plate and shape business extremely dull.

Warehouse Business.—Sheet prices have been shaded and there is some falling off in the demand on all products, but it is particularly noticed in sheets, which for several weeks showed improvement. Some car business expected by warehouses seems to have been taken by mills. In general demand is well balanced and no material is more sought after than another.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.90c.; plates, 2.90c.; plates, No. 8 gage, 3.25c.; soft steel bars and shapes, 2.80c.; hoops, 3.50c.; blue annealed sheets, No. 10, 3.30c.; galvanized steel sheets, No. 28, 5c.; black sheets, No. 28, 4c.; cold-rolled strip steel, 6.40c.; cold-rolled round shafting, 4.05c.

Old Material.—Sales of steel ranging in size from 200 to 500 tons have been made; one buyer having paid $12.50 and another as high as $13.50. Some cast scrap has moved at $16, but other than a feeling of confidence on the part of the dealers, there is little activity except scattered sales in small quantites.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	$13.00 to $13.50
Low phos., 0.004 and under	14.50 to 15.50
No. 1 railroad wrought	12.00 to 13.00
Car wheels	13.00 to 14.00
Machine shop turnings	4.00 to 5.00
Cast iron borings	4.00 to 5.00
Heavy axle turnings	8.00 to 9.00
Grate bars	8.00 to 9.00
No. 1 busheling	9.00 to 10.00
Stove plate	11.00 to 12.00
Bundled sheet stampings	6.00 to 7.00
No. 1 machinery cast	14.00 to 15.00
Hydraulic compressed	9.50 to 10.00
Railroad malleable	12.00 to 12.50

St. Louis

ST. LOUIS, Sept. 13.

Pig Iron.—The pig iron market is $1 higher, and the price of $24.88, delivered St. Louis, is generally being well maintained. Here and there resales are being made by brokers who bought before the recent advances at less than this. There is a decidedly firmer tone to the market. Buyers are taking on iron more freely, and the fact that efforts are being made to buy for next year's delivery is taken to indicate that melters are convinced that the price has reached bottom. There is an inquiry out for 40,000 tons of foundry iron for export. Several inquiries are out for from 1500 to 2500 tons, some calling for delivery into the first half of next year. A local melter bought 1000 tons of basic iron for September delivery. Another sale of 1000 tons of foundry iron was for delivery commencing in October and continuing through April. Sales of Granite City iron during the last week were 2800 tons made up of lots of 600 tons and less. None of the local by-product producers is selling for delivery beyond October.

We quote delivered consumers' yards St. Louis as follows, having added to furnace prices $2.80 freight from Chicago and $5.74 from Birmingham.

Northern foundry, sil. 1.75 to 2.25	$24.88
Northern malleable, sil. 1.75 to 2.25	24.88
Basic	24.88
Southern foundry, sil. 1.75 to 2.25	24.74

Finished Iron and Steel.—The only thing of interest in the structural steel line during the past week was

the report that the Omaha Technical and Commercial High School project had been revived, involving 1000 tons of plates, shapes and bars. The inquiry of the Baltimore & Ohio Railroad for 1000 all-steel 50-ton hopper and 1000 steel underframe box car bodies, as reported in THE IRON AGE last week, created unusual interest. The only railroad here that is buying regularly is the Missouri Pacific. Its purchases last week included a car each of plates and wheels, and smaller materials for immediate needs. It also is understood that it is in the market for steel underframes for repair work. The Missouri, Kansas and Texas Railroad, which recently decided to change from coal to oil in its locomotive fuel, has let contracts to the Graver Corporation, Graver, Ind., for four 100,000-barrel; three 55,000-barrel, and four 20,000-steel storage tanks. Warehouse business continues to grow better.

For stock out of warehouse we quote: Soft steel bars, 2.87½c. per lb.; iron bars, 2.87½c.; structural shapes, 2.97½c.; tank plates, 2.97½c.; No. 10 blue annealed sheets, 3.47½c.; No. 28 black sheets, cold rolled, one pass, 4.10c.; cold drawn rounds, shafting and screw stock, 4.20c.; structural rivets, $3.77½ per 100 lb.; boiler rivets, $3.87½; tank rivets, 7/16 in. and smaller, 60-10 per cent off list; machine bolts, large, 55 per cent; small, 60 per cent; carriage bolts, large, 50-5 per cent; small, 55 per cent; lag screws, 60 per cent; hot pressed nuts, square or hexagon blank, $3.25; and tapped, $3.00 off list.

Coke.—Coke is showing increased movement. There is a little better demand for foundry coke. One order placed during the week was for 2000 tons for the remaining months of this year. There was one inquiry out for 2000 to 2500 tons for nearby shipment, and another for 600 to 1000 tons. There is an increasing demand for domestic coke. Standard Connellsville foundry coke is quoted at $4.50 to $5 per net ton at ovens.

Old Material.—Although consumers still decline to become interested in the old material market, the tendency is toward higher levels and some grades have again advanced 50c. per ton over last week's quotations. It is a strictly dealer's market, however, as the prevailing opinion among brokers is that the mills must surely come into the market and they are buying up material with this end in view. However, the mills feel that the small tonnage on their books does not justify them in paying the advancing prices and until the railroads commence to place orders with them they will refrain from making purchases of material. The following railroad lists are before the market this week: Great Northern, 2250 tons; Missouri, Kansas & Texas, 1500 tons; Frisco Railway, 750 tons; Toledo, St. Louis & Western, 700 tons; Chicago, St. Paul, Minneapolis & Omaha, 300 tons, and Chicago & Eastern Illinois, 400 tons.

We quote dealers' prices, f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Iron Rails	$13.00 to $13.50
Steel rails, rerolling	12.00 to 12.50
Steel rails, less than 3 ft.	11.00 to 11.50
Relaying rails, standard section	29.00 to 30.00
Cast iron car wheels	12.50 to 13.00
No. 1 heavy railroad melting steel	11.00 to 11.50
No. 1 heavy shoveling steel	9.50 to 10.00
Ordinary shoveling steel	9.00 to 9.50
Frogs, switches and guards, cut apart	11.00 to 11.50
Ordinary bundle sheet	4.00 to 4.50
Per Net Ton	
Heavy axle and tire turnings	6.00 to 6.50
Iron angle bars	11.00 to 11.50
Steel angle bars	9.00 to 9.50
Iron car axles	16.50 to 17.00
Steel car axles	12.50 to 13.00
Wrought iron arch bars and transoms	13.00 to 13.50
No. 1 railroad wrought	10.50 to 11.00
No. 2 railroad wrought	10.00 to 10.50
Railroad springs	10.50 to 11.00
Steel couplers and knuckles	10.50 to 11.00
Locomotive tire, 42 in. and over, smooth inside	9.00 to 9.50
No. 1 dealer's forge	6.00 to 6.50
Cast iron borings	5.50 to 6.00
No. 1 busheling	9.50 to 10.00
No. 1 boilers cut in sheets and rings	6.00 to 6.50
No. 1 railroad cast	12.50 to 13.00
Stove plate and light cast	11.50 to 12.00
Railroad malleable	10.00 to 10.50
Agricultural malleable	9.00 to 9.50
Pipes and flues	7.50 to 8.00
Heavy railroad sheet and tank	6.00 to 6.50
Light railroad sheet	3.50 to 4.00
Railroad grate bars	8.50 to 9.00
Machine shop turnings	4.50 to 5.00
Country mixed iron	7.00 to 7.50
Uncut railroad mixed	8.00 to 8.50
Horseshoes	10.50 to 11.00
Railroad brake shoes	8.50 to 9.00

Philadelphia

PHILADELPHIA, Sept. 13.

Steel prices, with the exception of those for wire products, which were advanced last week $2 and $3 a ton, continue to show a declining tendency. Plates, shapes and bars may now be quoted at 1.60c. to 1.70c., Pittsburgh, the bulk of transactions being at 1.65c. on all three products. The 1.60c. price on bars is said to have been made only when combined with a tonnage of structural shapes and plates. In line with lower prices on steel bars, bar iron is off $1 a ton and is to be had at 1.60c. to 1.65c., Pittsburgh. The new prices on sheets recently announced by the leading interest and followed generally by its larger competitors are not holding. These prices—2.25c. on blue annealed, 2.75c. on black and 3.75c. on galvanized—are being shaded at least $1 a ton. An Eastern coal company is reported to have bought 300 tons of blue annealed sheets at 2.20c., Pittsburgh. In bolts, nuts, rivets and spikes there appears to be less price cutting than has prevailed in recent weeks.

No material improvement in the demand for steel products has come with the month of September, except in wire products, considerable business having been booked in the past week prior to the advance. Plates and sheets are extremely dull and there is only a moderate volume of business in bars and structural shapes.

Pig Iron.—A significant feature of the foundry pig iron market is that consumers who have been buying a carload or two at a time for months are now inquiring for their requirements for last quarter of this year and first quarter of next year. Eastern Pennsylvania furnaces are a unit in declining to quote for next year and one New Jersey furnace has withdrawn all quotations except for September shipment, this being due to the uncertainty as to coke prices. While spot furnace coke is to be had at $3.25, Connellsville, contract coke is not available at this price, some operators naming about $4. As Eastern furnace operators claim to be losing $4 or $5 a ton on iron with present costs, they do not care to accept too much forward business at present prices with the possibility of costs going higher. Sales within the past week have totaled several thousand tons, and there is a fair volume of business pending, mostly in lots of 100 to 800 tons in this district, though eastern Pennsylvania furnaces are quoting on four or five inquiries from the New York and New England districts which aggregate about 20,000 tons. The week's sales included 3000 tons to one melter and 1000 tons to another; also 1000 tons of basic iron to a plate manufacturer, the price being $19.25, delivered. Prices on foundry iron are unchanged, though they are no firmer. No. 2 plain iron is available from at least two furnaces at $19.50, furnace, and No. 2 at $20, furnace. One furnace quotes $20 for No. 2 plain and $20.50 for No. 2X and still another asks $20.50 for No. 2 plain and $21 for No. 2X. With furnaces losing money at present prices, the prospect of other merchant furnaces coming into blast within the near future are not good. One furnace operator was considering putting his stack in operation, but after careful analysis of the situation decided not to do so. Furnace stocks show a slight decrease and much of the iron now on furnace yards is not of standard analysis.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to $1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$20.34 to $21.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	20.84 to 21.76
Virginia No. 2 plain, 1.75 to 2.25 sil.	27.74 to 28.74
Virginia No. 2X, 2.25 to 2.75 sil.	28.24 to 29.74
Basic deliv. eastern Pa.	19.25
Gray forge	20.00 to 21.00
Malleable	22.00 to 23.00
Standard low phos. (f.o.b. furnace)	36.50
Copper bearing low phos. (f.o.b. furnace)	35.00

Ferroalloys.—One British agent is reported to have received authorization to quote ferromanganese at $58.35, Atlantic seaboard; others continue to quote $65. The domestic price remains at $70, delivered. Spiegeleisen is quoted at $27 to $28, furnace.

Semi-Finished Steel.—With little or no demand, prices for semi-finished remain unchanged. Open-hearth

rerolling billets are $30, and forging quality $35, Pittsburgh.

Plates.—The plate market continues exceedingly dull. Probably less tonnage is being booked than in any steel product. Prices are weaker, it being easy to buy plates at 1.65c., Pittsburgh, while 1.60c. can be done on desirable lots.

Structural Shapes.—Some Eastern mills are strongly competing for orders for shapes at the expense of prices. Ordinary lots of shapes can be bought at 1.65c. to 1.70c., Pittsburgh, while a fair-sized tonnage would command a price a low as 1.60c., Pittsburgh.

Bars.—The steel bar price on ordinary lots is now 1.65c., Pittsburgh, but 1.60c. has been done on reinforcing bars of standard specification when combined with orders for plates and shapes. An Eastern company is reported to have quoted as low as 1.50c., Pittsburgh, on steel bars, but this is not confirmed here. Bar iron is off $1 a ton, being available at 1.60c. to 1.65c., Pittsburgh. An export order for 5000 tons of iron or steel bars, threaded at one end, is reported to have been placed by a New York export company at 1.76c., Pittsburgh, including the extra for threading.

Sheets.—A company in the Pittsburgh district has quoted prices on sheets about $1 a ton less than the figures named in the announcement recently of the American Sheet & Tin Plate Co. Those prices were 2.25c. on blue annealed, 2.75c. on black and 3.75c. on galvanized, Pittsburgh. A coal company is reported to have placed 300 tons of blue annealed sheets at 2.20c., Pittsburgh.

Track Supplies.—Railroad companies are inquiring more freely for spikes and track bolts. The Pennsylvania Railroad is in the market for 450,000 to 900,000 spikes and a large quantity of heat-treated track bolts. The Philadelphia & Reading and the Philadelphia Rapid Transit Co. have also inquired for track bolts. It is stated that railroad buying of track supplies has increased considerably within the past few weeks.

Warehouse Business.—A fair improvement in sales of steel out of stock is reported. Jobbers are in some instances buying more freely for stock. Prices on black and galvanized sheets and cold-rolled steel have been revised downward. We quote for delivery in Philadelphia as follows:

Soft steel bars and small shapes, 2.75c.; iron bars (except bands), 2.50c.; round edge iron, 2.80c.; round edge steel, iron finish, 1½ in. x ½ in., 3.05c.; round edge steel planished, 3.80c.; tank steel plates, ¼-in. and heavier 2.85c.; tank steel plates, 3/16-in. 3.035c.; blue annealed steel sheets, No. 10 gage, 3.25c.; light black sheets, No. 28 gage, 3.75c.; galvanized sheets, No. 28 gage, 4.75c.; square twisted and deformed steel bars, 2.75c.; structural shapes, 2.85c.; diamond pattern plates, ¼-in., 4.60c.; 3/16-in., 4.785c.; ⅛-in., 4.90c.; spring steel, 4.10c.; round co'd-rolled steel, 4c.; squares and hexagons, cold-rolled steel, 4.50c.; steel hoops, No. 13 gage and lighter, 3.65c.; steel bands, No. 12 gage to 3/16-in., inclusive, 3.40c.; iron bands, 3.90c.; rails, 2.75c.; tool steel, 8c.; Norway iron, 5c.; toe steel, 4.50c.

Old Material.—The scrap market shows some evidences of a firmer tendency. Fair tonnages of No. 1 railroad wrought have been sold at $15 and $15.50, an advance of 50c. a ton. Heavy axle turnings are 50c. higher. Heavy melting steel is firmer without any actual change in price. We quote for delivery in this district as follows:

No. 1 heavy melting steel	$11.50 to $12.00
Scrap rail	11.50 to 12.00
Steel rails, rerolling	15.00 to 15.50
No. 1 low phos., heavy 0.04 and under	16.00 to 17.00
Car wheels	17.00 to 17.50
No. 1 railroad wrought	15.00 to 15.50
No. 1 yard wrought	13.50 to 14.00
No. 1 forge fire	10.00 to 10.50
Bundled sheets (for steel works)	8.00 to 9.00
No. 1 busheling	11.50 to 12.00
No. 2 busheling	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use)	8.00 to 8.50
Mixed borings and turnings (for blast furnace use)	8.00 to 8.50
Machine-shop turnings (for rolling mill and steel works use)	8.00 to 8.50
Heavy axle turnings (or equivalent)	9.50 to 10.00
Cast borings (for rolling mills)	9.25 to 9.75
Cast borings (for chemical plants)	No market
No. 1 cast	17.00 to 18.00
Railroad grate bars	12.50 to 13.50
Stove plate (for steel plant use)	12.50 to 13.00
Railroad malleable	15.50 to 16.50
Wrought iron and soft steel pipes and tubes (new specifications)	13.00 to 13.50
Iron car axles	No market
Steel car axles	No market

Lake Placid Meeting of Electrochemists

The fortieth general meeting, marking the end of the second decade since the organization of the American Electrochemical Society, will take place at the Lake Placid Club, in the Adirondacks, New York, Sept. 29, 30 and Oct. 1. The technical program will be featured by two symposia on non-ferrous metallurgy and electrodeposition. The program follows, in part:

Thursday, Sept. 29

9:00 a. m.—Miscellaneous papers:

Charles Vickers: "Experiences with Alkaline and Alkaline Earth Metals in Connection with Non-Ferrous Alloys."

W. A. Cowan, L. D. Simpkins and G. O. Hiers: "The Electrolytically Produced Calcium-Barium-Lead Alloys Comprising Frary Metal."

Colin G. Fink and Chas. H. Eldridge: "The Electrolytic Corrosion of Lead-Thallium Alloys."

J. Newton Friend: "A New Theory of the Corrosion of Iron."

Haakon Styri: "Rust Prevention by Slushing."

8:00 p. m.—Meeting in the music room of the Forest Clubhouse. Lecture by Prof. Harlow Shapley, of the Harvard University Observatory, on "Chemistry and the Stars."

Friday, Sept. 29

9:00 a. m.—Symposium on non-ferrous metallurgy:

H. M. St. John: "The Influence of the Electric Furnace on the Metallurgy of Non-Ferrous Metals."

E. A. Smith: "Modern Developments in the British Brass Industry."

T. F. Baily: "Resistance Type of Electric Furnace in the Melting of Brass and Other Non-Ferrous Metals."

N. K. B. Patch: "Comparison of Electric Furnace Practice with That of Fuel Fired Furnace Practice."

H. A. DeFries: "Electric Silver Melting."

F. C. Thompson: "Electric Furnace Melting of Nickel-Silver."

H. A. Winne: "Recent Developments in Electric Furnaces of the Muffled Arc Type."

J. G. Thompson: "Electric Furnace Purification of Zirkite."

M. L. Hartmann and W. A. Koehler: "Physical Characteristics of Specialized Refractories. Part IV. Cross Breaking Strength at 20 and 1350 deg. C."

8:00 p. m.—Lecture by Col. T. S. Woolsey, Jr., on "Practice of Forestry on National Forests," to be held in the music room of the Forest Clubhouse.

Saturday, Oct. 1

9:00 a. m.—Symposium on electrodeposition:

F. A. Lidbury and F. A. Stamps: "An Electric Steam-Generator for Low Voltage."

W. E. Hughes: "Researches on the Electrodeposition of Iron."

T. R. Briggs: "Electrolytic Solution and Deposition of Copper."

W. R. Ingalls: "Electrometallurgy of Zinc."

C. J. Wernlund: "Deposition of Zinc from the Zinc Cyanide Solution."

Wm. Blum and H. E. Haring: "The Electrodeposition of Lead-Tin Alloys."

Wm. Blum: "The Structure and Properties of Alternately Electrodeposited Metals."

Directors of the American Iron and Steel Institute have presented to the Butler Art Institute at Youngstown, Ohio, a bronze bust of Joseph G. Butler, Jr., long a member of the board of directors of the Institute. The bust is the personal gift of the directors, for whom Willis L. King, vice-president Jones & Laughlin Steel Co., Pittsburgh, acted in making the presentation. The speech of acceptance was by James A. Campbell, president Youngstown Sheet & Tube Co., and also a director of the American Iron and Steel Institute. The bust is a replica of the representation of Mr. Butler which stands in the McKinley Memorial Building at Niles, Ohio, both being the work of J. Massey Rhind, New York sculptor.

A course in labor and employment management for Thursday evenings, beginning Sept. 22, is announced by New York University by its department of business management, School of Commerce, Accounts and Finance, 32 Waverly Place, New York. The course is to be conducted by J. D. Hackett, who has been identified with industrial establishments and later on his own account as labor consultant.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia	$0.35	St. Paul	$0.665
Baltimore	0.335	Omaha	0.815
New York	0.38	Omaha (pipe)	0.77
Boston	0.415	Denver	1.35
Buffalo	0.295	Denver (wire products)	1.415
Cleveland	0.24	Pacific Coast	1.665
Cincinnati	0.325	Pacific Coast, ship plates	1.335
Indianapolis	0.345	Birmingham	0.765
Chicago	0.38	Jacksonville, all rail	0.555
St. Louis	0.475	Jacksonville, rail and water	0.46
Kansas City	0.815	New Orleans	0.515
Kansas City (pipe)	0.77		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver, the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, $1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2½c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, ¼ in. thick and over, and zees, structural sizes, 1.70c. to 1.80c.

Wire Products

Wire nails, $2.90 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of $1.25 and shorter than 1 in., $1.75; bright Bessemer and basic wire, $2.60 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.60; galvanized wire, $3.10; galvanized barbed wire, $3.55; galvanized fence staples, $3.55; painted barbed wire, $3.05; polished fence staples, $3.05; cement-coated nails, per count keg, $2.45; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 68 to 70½ per cent off list for carload lots, 67 to 69½ per cent for 1000-rod lots, and 66 to 68½ per cent for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets.....$2.20 to $2.50
Large boiler rivets.....2.35 to 2.60
Small rivets ....65, 10 and 10 to 65, 10, 10 and 5 per cent off list
Machine bolts, small, rolled threads, 70, 10 and 7½ per cent off list
Machine bolts, small, cut threads, 65 and 10 to 70 and 5 per cent off list
Machine bolts, larger and longer, 65 and 10 to 65, 10 and 5 per cent off list
Carriage bolts, ⅜ in. x 6 in.:
Smaller and shorter rolled threads..70 and 5 per cent off list
Cut threads .....65 and 10 per cent off list
Longer and larger sizes.....60, 10 and 5 per cent off list
Lag bolts .....70, 10 and 5 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads....60 and 10 per cent off list
Other style heads .....20 per cent extra
Machine bolts, c.p.c. and t. nuts, ⅜ in. x 4 in.:
Smaller and shorter.....60, 10 and 5 per cent off list
Larger and longer sizes.....60 and 5 per cent off list
Hot pressed sq. or hex. blank nuts.....$4.60 to $5.25 off list
Hot pressed nuts, tapped..... 4.25 to 5.00 off list
C.p.c. and t. sq. or hex. blank nuts..... 4.60 to 5.10 off list
C.p.c. and t. sq. or hex. blank nuts, tapped. 4.25 to 4.75 off list
Semi-finished hex. nuts:
⅛ in. to 9/16 in. inclusive.....80, 10 and 10 per cent off list
Small sizes S. A. E.....80, 10, 10 and 10 per cent off list
⅝ in. to 1 in. inclusive, U. S. S. and S. A. E., 70, 10, 10 and 10 per cent off list
Stove bolts in packages.....80, 10 and 5 per cent off list
Stove bolts in bulk.....80, 10 and 7½ per cent off list
Tire bolts .....65, 10 and 10 per cent off list
Track bolts .....3.50c. to 3.75c. base

Mill Square and Hex. Head Cap Screws

½ in. and under.....70 and 10 per cent off list
9/16 in. to ¾ in.....70 and 10 per cent off list

Mill Set Screws

½ in. and under.....70, 10 and 5 per cent off list
9/16 in. to ¾ in.....70, 10 and 5 per cent off list

Rivets

Rivets, 1c. per lb. extra for less than 200 kegs. Rivets in 100-lb. kegs, 25c. extra to buyers not under contract; small and miscellaneous lots less than two tons, 25c. extra; less than 100 lb. of a size or broken kegs, 50c. extra.

All prices carry standard extras f.o.b. Pittsburgh.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, $38 to $41; chain rods, $38 to $41; screw stock rods, $43 to $46; rivet and bolt rods and other rods of that character, $38 to $41; high carbon rods, $46 to $53, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes 9/16-in. and larger, $2.40 to $2.50 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, ½-in., ⅝-in. and 7/16-in., $2.65 to $2.75 base; 5/16-in., $2.65 to $2.75 base. Boat and barge spikes, $2.65 to $2.75 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, $3.50 to $3.75 base per 100 lb. Tie plates, $2 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., $11.30 per package; 8-lb. coating, I. C., $11.60; 15-lb. coating, I. C., $14.30; 20-lb. coating, I. C., $15.55; 25-lb. coating, I. C., $16.80; 30-lb. coating, I. C., $17.80; 35-lb. coating, I. C., $18.80; 40-lb. coating, I. C., $19.80 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.60c. to 1.75c. from mill. Refined bar iron, 2.25c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld

Steel			Iron		
Inches	Black	Galv	Inches	Black	Galv.
⅛	50½	24	¼ to ⅜	+3½	+22½
¼ to ⅜	53½	27	½	36½	18½
½	58½	44	¾	42½	27½
¾	62½	50	1 to 1½	44½	29½
1 to 3	64½	52			

Lap Weld

2	56½	44	2	39½	25½
2½ to 6	60½	48	2½ to 6	42½	29½
7 to 12	57½	44	7 to 12	40½	27½

Butt Weld, extra strong, plain ends

⅛	46½	29	¼ to ⅜	+4½	+37½
¼ to ⅜	49½	32	½	35½	23½
½	55½	44	¾	42½	28½
¾	60½	49	1 to 1½	44½	30½
1 to 1½	62½	51			
2 to 3	63½	52			

Lap Weld, extra strong, plain ends

2	54½	43	2	40½	27½
2½ to 4	58½	47	2½ to 4	43½	31½
4½ to 6	57½	46	4½ to 6	42½	30½
7 to 8	53½	40	7 to 8	35½	23½
9 to 12	48½	35	9 to 12	30½	18½

To the large jobbing trade the above discounts are increased by one point, with extra discounts of 5 and 2½ per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		*Charcoal Iron*	
1¾ in.	21½	1½ in.	List
2 to 2¼ in.	36	1¾ to 1⅞ in.	10
2½ to 3 in.	47	2 to 2¼ in.	20
3¼ to 13 in.	52	2½ to 3 in.	25
		3¼ to 4½ in.	27

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed

Cents per Lb.		Cents per Lb.	
No. 8 and heavier	2.15	Nos. 11 and 12	2.35
Nos. 9 and 10 (base)	2.25	Nos. 13 and 14	2.45
		Nos. 15 and 16	2.55

Box Annealed, One Pass Cold Rolled

Cents per Lb.		Cents per Lb.	
Nos. 17 to 21	2.45	No. 28 (base)	2.75
Nos. 22 to 24	2.50	No. 29	2.80
Nos. 25 and 26	2.65	No. 30	2.95
No. 27	2.70		

Galvanized

Cents per Lb.		Cents per Lb.	
Nos. 10 and 11	2.75	Nos. 25 and 26	3.45
Nos. 12 to 14	2.85	No. 27	3.60
Nos. 15 and 16	3.00	No. 28 (base)	3.75
Nos. 17 to 21	3.15	No. 29	4.00
Nos. 22 to 24	3.30	No. 30	4.25

Tin-Mill Black Plate

Cents per Lb.		Cents per Lb.	
Nos. 15 and 16	2.55	No. 28 (base)	2.75
Nos. 17 to 21	2.60	No. 29	2.80
Nos. 22 to 24	2.65	No. 30	2.80
Nos. 25 to 27	2.70	Nos. 30½ and 31	2.85

Non-Ferrous Metals

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin	Lead		Zinc	
Sept.	Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis
7	12.00	11.75	27.25	4.50	4.30	4.70	4.20
8	12.00	11.87½	27.00	4.50	4.30	4.70	4.20
9	12.00	11.87½	26.50	4.60	4.40	4.70	4.20
10	12.00	12.00	....	4.60	4.40	4.70	4.20
12	12.25	12.00	26.62½	4.60	4.40	4.70	4.20
13	12.25	12.00	26.75	4.60	4.40	4.70	4.20

New York

NEW YORK, Sept. 13.

The tone of all the markets continues to improve without much increase in buying. Prices for copper have advanced, but buying is not large. The tin market continues quiet, but a little easier. There is a steady demand for lead and prices have again advanced. Buying of zinc has improved only a little, but prices are a shade firmer.

Copper.—There has been a marked improvement in the asking price of sellers not only in the last week, but in the last two or three weeks; the disappointing feature, however, is the absence of domestic buying. Inquiry is fairly good from such sources, but it does not develop into much business. This week a still better feeling is reported and representatives of brass interests state that there has been an improvement in their business. It is also pointed out that the large quantities of scrap brass have been largely consumed so that the outlook for the copper market is better. Electrolytic copper for early delivery is quoted at 12.25c., delivered, or 12c., New York, for early delivery, by some sellers, with others still out of the market. Forward positions are ⅛c. to ¼c. higher. Lake copper is largely nominal at 12.25c., New York. Buying for foreign consumption is and has been good, particularly by Japan and Germany.

Tin.—The week has been dull and uninteresting, and transactions have been very light. For the most part prices here have ruled below parity in London, so that there has been a little buying from that market. On the New York Metal Exchange 50 tons of spot Straits tin has been sold for future shipment at 27c. for July-August shipment and 26.62½c. for December delivery. The London market to-day was about £5 per ton lower than a week ago, with spot standard quoted at £156 12s. 6d. future standard, £158 15s. and spot Straits at £157 7s. 6d. per ton. Spot Straits, New York, to-day was quoted at 26.75c. Arrivals thus far this month have been 2075 tons, with 2085 tons reported afloat.

Lead.—Again last week the American Smelting & Refining Co. advanced its price 10 points, to 4.60c., New York and St. Louis. Quotations in the outside market are 4.60c., New York, or 4.40c., St. Louis. A steady business is reported in both markets, and it is rumored that on this last advance in price heavy buying followed, with the result that the leading interest is not now so keen for business as recently.

Zinc.—Prime Western for early delivery is quoted at 4.20c. to 4.25c., St. Louis, or 4.70c. to 4.75c., New York, for early delivery. While the tone of the market has improved, actual buying has not increased, but the number of sellers at concessions has diminished so that the market can be regarded as firmer.

Antimony.—Wholesale lots for early delivery are quoted at 4.40c., New York, duty paid, with the market quiet.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is obtainable from importers at 19c. to 20c., New York, duty paid, while the same grade from the leading domestic producer is quoted at 24.50c., f.o.b. plant, for wholesale lots for early delivery.

Old Metals.—The market is firm and values are higher. Dealers' selling prices are nominally as follows:

	Cents Per Lb.
Copper, heavy and crucible	11.75
Copper, heavy and wire	11.00
Copper, light and bottoms	9.00
Heavy machine composition	9.75
Brass, heavy	6.75
Brass, light	5.00
No. 1 red brass or composition turnings	7.75
No. 1 yellow rod brass turnings	4.875
Lead, heavy	4.00
Zinc	3.00
Lead, tea	3.00

Chicago

Sept. 13.—Copper and lead have advanced, while tin has declined. Copper has stiffened principally because stocks in second hands are gone and producers refuse to sell at concessions. The advance of the leading lead producer has carried this metal upward and has induced some buying. In general, the metals are very quiet. Old metal prices remain unchanged. We quote in carload lots: Lake copper, 12.50c. to 12.75c.; tin, 28c. to 28.50c.; lead, 4.50c.; spelter, 4.30c. to 4.35c. in less than carload lots; antimony, 7c. On old metals we quote: Copper wire, 7c.; crucible shapes, 7c.; copper clips, 7c.; copper bottoms, 6c; red brass, 6c.; yellow brass, 4.50c.; lead pipe, 2.50c.; zinc, 1.75c.; pewter, No. 1, 17c.; tin foil, 18c.; block tin, 20c.; all buying prices for less than carload lots.

St. Louis

ST. LOUIS, Sept. 13.—The non-ferrous markets continue dull. Lead and zinc are slightly higher. We quote lead at 4.40c., carlots, and zinc at 4.25c. We quote Lake copper at 12.73⅝c. to 12.86⅛c., carlots; tin, 27.36c., and antimony, 5.23½c. In old metals we quote: Light brass, 3.50c.; heavy yellow brass, 5c.; heavy red brass, heavy copper and copper wire, 7.50c.; light copper, 6.50c.; block tin, 20c.; tin foil, 18c.; zinc, 2.75c.; lead, 3c.; tea lead, 2c. and aluminum, 9c.

Germans Lowest Bidders on Cars and Pumps

WASHINGTON, Sept. 13.—Based on the value of 70.42c. for the gold peso, quoted yesterday, the German makers bid the equivalent of $2,706, American makers $3,225, Belgian makers $3,521 and British makers $4,154 each on small freight cars for the South American market. On pumps the Germans were also lowest at 400 paper pesos each. The lowest American bid was 830 pesos and the lowest British bid 1,618 pesos. In a cable to the Bureau of Foreign and Domestic Commerce, Commerce Attache Edward F. Feeley, Buenos Aires, cautions American makers against too much emphasis being put on price, because quantity, quality, delivery, terms and credit arrangements are not ignored. In these respects American bidders are on at least an even footing with European competitors, and are making better price terms than any of them, with the exception of those in Germany.

Gain in British Pig Iron and Steel Output in August

(*By Cable*)

LONDON, ENGLAND, Sept. 13.—The production of pig iron in August was 93,600 gross tons and of steel ingots and castings 432,600 tons.

These figures compare with an output of only 800 tons and 10,200 tons of pig iron in June and July respectively and with 2700 tons and 117,200 tons of steel ingots and castings in the same two months respectively. The August steel output of 432,600 tons compares with 483,500 tons and 493,400 tons in February and January respectively. In steel output the industry is rapidly recovering from the paralyzing effect of the coal strike.

LOWER MILL WAGES

Average Reduction of Sheet and Tin Mill Workers Is 41.25 Per Cent from War Peak

YOUNGSTOWN, OHIO, Sept. 13.—Average price of tin plate shipped during July and August by mid-Western mills subscribing to the wage agreement with the Amalgamated Association of Iron, Steel and Tin Workers, was $5 per base box, as disclosed at the bi-monthly settlement here Sept. 12. The subscribers represent the bulk of the independent capacity of the country, and the average price indicates that there has been considerable difference in sales of the constituent companies. The spread on shipments has been from $4.75 to $5.25 per base box.

Two months before, the average price on tin plate shipments was $5.95. There is a difference, therefore, of 19 points in the average price of tin plate in the periods covered, which involves a reduction of 19 per cent in the tonnage rate to be paid affected workers during the September-October period. Under the new annual agreement, the tonnage rate rises or falls at the rate of 1 per cent for each 5c change in selling price. Under last year's agreement, the change was made at the rate of 1⅛ per cent.

Under the new rate, tin mill workers will still be 30 per cent. above base, though 36 per cent. below the peak rate paid during the war.

The average invoiced price of Nos. 26, 27 and 28 gage black sheets was found to be 3.10c per lb., as compared with 3.85c two months ago, and involves a reduction for affected workers of 15 per cent. Union sheet mill employees will be paid 28½ per cent. above base in September and October, but will be 38.5 per cent. under the peak rates paid during the war.

James H. Nutt, secretary of the Western Sheet & Tin Plate Manufacturers' Association, acted for the employers, while M. F. Tighe, president of the Amalgamated Association, represented the employees.

Under normal conditions, 25,000 workers would be affected by the agreement.

Mr. Nutt has compiled a statement showing the percentage of reduction from the peak rates for the following operations: Puddling, 51 per cent.; heavy scrap rolling, 52 per cent.; muck rolling, 50 per cent.; heating piles on boards, 42 per cent; knobbling, 40 per cent; bar mill heating and roll hands. 48 per cent; guide mill, base sizes, 41 per cent.; guide mill extras, 44 per cent.

The average reduction on the above and for sheet and tin mill workers, is 41.25 per cent., from the war peak rates.

Plant Activities

Several departments of the Eagle Lock Co., Terryville, Conn., which have been operating on short time, have resumed a 54-hr. per week schedule.

The E. D. G. Jones & Sons Co., Pittsfield, Mass., paper making machinery, for the second time this year has reduced wages of its 250 employees 10 per cent.

The Westfield Mfg. Co., Westfield, Mass., bicycles and motorcycles, which has been operating with a curtailed working force and on short time, has resumed production in all departments.

Largely because of the difficulty in securing automobile bodies, the reopening of the Rolls-Royce of America, Inc., Springfield, Mass., plant was postponed from Sept. 6 until Oct. 1.

The 350 piece workers of the L. S. Starrett Co., Athol, Mass., tool manufacturer, have been notified of a reduction of 10 per cent in their rate of pay. The plant is operating 3½ days a week.

The Millers Falls Co., Millers Falls, Mass., maker of small tools, is operating its plant 50 hr. per week instead of 48 hr. as heretofore. It will not be operated Saturdays for the present and only a limited number of employees has been taken on.

The Graton & Knight Mfg. Co., Worcester, Mass., manufacturer of belting, has adjusted wages to equalize rates of pay. Some employees receive as much as heretofore, while others have had a slight reduction in wages. The plant is operating every week-day and employing about 900.

Smith & Wesson, Springfield, Mass., makers of firearms, scheduled to reopen Sept. 6, remain closed. Harold Wesson, president, states that business, although getting back on a sounder basis, does not warrant the plant's resuming operations. It is possible it will reopen within a month.

More than 1000 employees of the Royal Typewriter Co., Hartford, Conn., reported for work last week. Eight departments are working on a 5-day and the rest on a 4-hr. day per week schedule. The management plans to increase the number of working hours within the near future. The plant had been closed three weeks.

Little Change in Refractories Market

PITTSBURGH, Sept. 12.—The refractories market does not change much. In almost all consuming districts demands are purely hand-to-mouth. Blast furnace interests and steel companies are taking on merely such supplies as are actually needed; most of them have stocks and are drawing from them and are purchasing only for replenishment. Since manufacturers are supplying such demands from their own stocks, plant activities are largely on special sizes and shapes not ordinarily carried in stock. It is doubtful if fire clay and silica brick works, taking the country as a whole, are as much as 20 per cent engaged. In all producing districts there are idle plants, while part time operations rule at those which are running. Conditions both as regards demand and plant activities reflect closely those now prevailing in the iron and steel industry. There has been no change in public quotations of the several kinds of brick, which for the most part are nominal. Sizable orders undoubtedly would lead to price concessions.

We quote per 1000 f.o.b. works:

Fire Clay	High Duty	Moderate Duty
Pennsylvania	$34.00 to $40.00	$28.00 to $34.00
Ohio	34.00 to 38.00	28.00 to 33.00
Kentucky	33.00 to 37.00	30.00 to 35.00
Illinois	35.00 to 40.00	30.00 to 35.00
Missouri	37.00 to 42.00	28.00 to 33.00
Silica Brick:		
Pennsylvania		33.00 to 35.00
Chicago		38.00 to 42.00
Birmingham		46.00
Magnesite Brick:		
Standard size, per net ton		65.00
Chrome Brick:		
Standard size, per net ton		52.00

Steel Corporation's Orders Decrease

Unfilled orders on the books of the United States Steel Corporation Aug. 31 were 4,531,926 tons, compared with 4,830,324 tons on July 31. This is a decrease of 298,398 tons, and compares with one of 287,544 tons in July, 364,619 tons in June, 362,737 tons in May, 439,541 tons in April, 649,102 tons in March, 639,297 ton sin February, and 574,958 ton sin January, and represents the thirteenth consecutive monthly decrease reported. The unfilled tonnage a year ago was 10,805,038 tons, or 6,273,112 tons more. The table below gives the unfilled tonnage at the close of each month, beginning with January, 1918:

	1921	1920	1919	1918
Jan. 31	7,573,164	9,285,441	6,684,268	9,477,853
Feb. 28	6,933,867	9,502,081	6,010,787	9,288,443
Mar. 31	6,284,765	9,892,075	5,430,572	9,056,404
Apr. 30	5,845,224	10,359,747	4,800,865	8,741,882
May 31	5,482,487	10,940,465	4,282,310	8,337,623
June 30	5,117,868	10,978,817	4,892,855	8,918,866
July 31	4,830,324	11,118,468	5,578,661	8,883,801
Aug. 31	4,531,926	10,805,038	6,109,103	8,759,042
Sept. 30	.....	10,374,804	6,284,638	8,297,905
Oct. 31	.....	9,836,852	6,472,668	8,353,293
Nov. 30	.....	9,021,481	7,128,330	8,124,663
Dec. 31	.....	8,148,122	8,265,366	7,379,172

The largest total of unfilled orders was on April 30, 1917, when it was 12,183,083 tons. The lowest was on Dec. 31, 1910, at 2,605,747 tons.

PERSONAL

Norman Allderdice, formerly in charge of the open-hearth department of the Lorain, Ohio, plant of the National Tube Co., became sales manager for the Pittsburgh and Cleveland districts of Manning, Maxwell & Moore, Inc., on Sept. 1, succeeding Robert A. Bole, vice-president and manager of the Pittsburgh district, who died about four months ago. Under Mr. Allderdice's management the open-hearth department made a splendid record. He carries with him to his new position a knowledge of steel plant machinery and equipment. He is the son of Taylor Allderdice, vice-president National Tube Co. His headquarters will be maintained at 1005 Park Building, Pittsburgh. He is a member of several Pittsburgh clubs, including the Duquesne Club and the Pittsburgh Athletic Club Association. H. J. Hair, who has been office manager of the Pittsburgh office, becomes district sales manager for the Pittsburgh territory and E. W. Winship remains as district sales manager in Cleveland.

F. V. Archer, formerly manager of Naumburg & Co., New York, has assumed the duties of vice-president in charge of finance, cost and expenditures of the Thacher Propeller & Foundry Corporation, Albany, N. Y.

G. A. Thompson and J. R. Hussey announce that their interests in the Thompson Machinery Co. have been purchased by the Brown & Zortman Machinery Co., Second Avenue, Pittsburgh, with which company they will in the future be identified.

E. S. Gregg, formerly of Galveston, Tex., but more recently of New York, has begun work as chief of the transportation division of the Bureau of Foreign and Domestic Commerce. He is a graduate of Austin College, Tex., and he took a graduate course in transportation at the University of Chicago. During the war he was connected with the shipping section of the general staff of the War Department. Since the war he has been associated with the American International Corporation as adviser on shipping conditions.

Commander R. C. Hilliard, construction officer, Charlestown (Boston) Navy Yard, has been assigned as construction officer of the Atlantic fleet and reported for duty at Newport, R. I., Sept. 10.

Frank J. Fahey, vice-president Gillette Safety Razor Co., Boston, has returned from a business trip to Europe. He says business conditions are better than a year ago.

Col. Elmer H. Havens, of the steel jobbing firm of Hunters & Havens, Bridgeport, Conn., has been elected president of the Locomobile Co. of America, Bridgeport. Frank R. Hickman is associated with Colonel Havens as vice-president and treasurer. With this change in the officiary of the company the Locomobile Co. also is wholly divorced from Hares Motors, Inc., which had charge of manufacturing and selling the automobiles made at the Locomobile plant.

Ogden R. Adams, machinery merchant of Rochester, N. Y., has been elected president and general manager of the Seneca Falls Mfg. Co., Seneca Falls, N. Y., manufacturer of Star and Adams Short-Cut lathes. Mr. Adams still remains at the head of, and actively identified with, his Rochester business in machinery and equipment.

Oscar J. Maynard, sales department, Langelier Mfg. Co., Arlington, Cranston, R. I., special machinery and tools, has resigned to engage in business for himself. He is succeeded by William R. Renton.

Vernon Campbell, formerly with the Boston office of the Becker Milling Machine - Whitcomb-Blaisdell Machine Tool - Reed-Prentice companies, has associated with the Boston office of the South Bend Lathe Works.

G. E. Sanford, safety engineer General Electric Co., and president American Society of Safety Engineers, will speak on "Foundry Hazards and Safeguards" at the first fall meeting of the New England Foundrymen's Association, Wednesday, Sept. 14, at the Exchange Club, Boston. N. M. Du Chemin, secretary General Electric Co., Lynn., Mass., works safety committee, will address the association members on "Selling Safety."

E. Howard Green has been made chairman of the Worcester, Mass., executive committee of the American Society of Mechanical Engineers, and Harry M. Latham, secretary and treasurer.

John F. Tinsley, manager Crompton & Knowles Loom Works, Worcester, Mass., has been made permanent chairman of a mayor's committee appointed to cooperate with the Worcester branch, National Safety Council in connection with a safety week in Worcester, Sept. 26 to Oct. 3.

George Washington Brown, vice-president and chairman finance committee, United Shoe Machinery Corporation, Boston and Beverly, Mass., last week celebrated his eightieth birthday. Officers and employees of the corporation filled his office with flowers.

Joseph J. Wilson, gray iron foundry manager for the Saginaw Products Co. division of the General Motors Corporation, Saginaw, Mich., has resigned to enter business in Detroit.

Robert S. Fowler, formerly assistant sales manager of the Northway Motor & Mfg. Co. division of the General Motors Corporation, and prior to that for six years with the Anderson Electric Co., Detroit, has been made district representative of the Wheel Trueing Tool Co., Detroit. He will include in his district the territory in southeastern Michigan and Toledo, Ohio. E. F. Robinson, who has been with the company as sales manager, has resigned to resume the practice of law in Ravenna, Ohio.

James A. Campbell, president Youngstown Sheet & Tube Co., Youngstown, Ohio, celebrated his 67th birthday on Monday. Mr. Campbell was born in Ohltown, Trumbull county, Ohio, Sept. 11, 1854. He received messages of felicitation from a wide group of associates in the steel industry.

George B. Bell, Jamaica, N. Y., has been appointed chief of the agricultural implements and vehicles division of the Bureau of Foreign and Domestic Commerce. He was with B. F. Avery & Sons, Louisville, Ky., engaged in export work for 20 years. He was later director of foreign sales with Bateman & Companies, New Jersey. He has traveled in many sections of the world, building up markets for American agricultural implements, and has had experience in this country in manufacturing, traffic, field demonstration, advertising and sales, etc.

William Knudsen, formerly of the Ford Motor Co., has joined the Ireland & Matthews Mfg. Co., Detroit, machinist and sheet metal goods manufacturer, as general manager.

The Bureau of Foreign and Domestic Commerce has announced the appointment of Dr. Samuel McClintock of Chicago as editorial adviser of the new commodities division, which among other things will be concerned with investigations of importance to the major industries. Dr. McClintock is an editorial writer and political economist. Some years ago he was consul in Latin America. He goes to the bureau in Washington from New York, where he was a consulting editor of the McGraw-Hill Book Co. and a lecturer in applied economics at the College of the City of New York.

George A. Armes, recently resigned as president and general manager of the Moore Shipbuilding Co., San Francisco, and Joseph Moore, vice-president of the company, was chosen as his successor. For the war effort Mr. Armes was loaned to the Shipping Board by the Bethlehem Shipbuilding Co. and later became head of the Moore company.

OBITUARY

CHARLES F. BRAGG, president N. H. Bragg & Sons, Bangor, Me., iron and hardware, died at his home in that city Sept. 11 in his seventy-first year. Since its inception, Mr. Bragg was actively associated with the New England Iron and Hardware Association, and probably was one of the most widely known New England iron and steel merchants. He was born in Dixmount, Me., but resided most of his life in Bangor. He served that city as mayor for three terms. Mr. Bragg was one of the promoters of the Bangor & Aroostook Railroad Co., was president of the Orono Pulp & Paper Co., and was interested in various other business enterprises.

RAYMOND SEARING BALDWIN, formerly of J. H. Williams & Co., makers of drop forgings, died at his summer home near Westerly, R. I., from heart disease, Sept. 3, after an illness of several months. He retired from active work last spring, being at the time controller and assistant treasurer of the company. As assistant to the president he had charge of the design and erection of the company's Buffalo plant. He was graduated from Stevens Institute in 1903 and for some time was connected with the Carbon Steel Co., Pittsburgh, as an engineer.

MATTHEW M. SWEENEY, general manager and secretary Fairmount Foundry & Engineering Works, Woonsocket, R. I., died Sept. 7 at his home there following a long illness. He was graduated from Brown University in 1906, and was a member of the American Society of Mechanical Engineers and other societies. He was born in Woonsocket 43 years ago.

MORRIS S. WRIGHT, president and general manager M. S. Wright Co., Worcester, Mass., maker of vacuum cleaners, died Sept. 5 of peritonitis. He was born in Janesville, Wis., June 11, 1859.

CHARLES W. DAVIS, vice-president Standard Underground Cable Co., Pittsburgh, died Sept. 11, in Memorial Hospital, New York, where he had gone for special medical treatment. He was born in Pittsburgh 48 years ago. He received his early education in the Pittsburgh public schools and was graduated from the Western University of Pennsylvania, now the University of Pittsburgh, later taking special courses at the Massachusetts Institute of Technology. He made his home in Sewickley, Pa.

CHARLES WILLIAM ELDREDGE, for several years associated with the Chapman Valve Mfg. Co., Springfield, Mass., and recently in charge of the H. W. Johns-Manville Co., Montreal, branch, died Sept. 9 at his home in East Longmeadow, Mass.

HENRY ELIOT, JR., president Eliot Frog & Switch Co., East St. Louis, Ill., died Sept. 9 at his home in St. Louis, from the effects of a cerebral hemorrhage sustained five months ago. He was born 67 years ago in Cincinnati, where he was educated in the public schools, and went to St. Louis in 1881. He was at one time engaged in the manufacture of railroad supplies, and about 15 years ago became president of the frog and switch company, in which he was active until he was stricken. He was a member of the Masonic fraternity. He is survived by two daughters, Mrs. Edward Mallinckrodt, Jr., and Miss Georgia Eliot. The funeral took place on Sept. 12.

RICHARD B. CARRAN, president R. B. Carran & Sons Co., brass manufacturer, Ludlow Ky., died at his home in that city recently. He was also president of the Ludlow Savings Bank, and a director of the Covington Bank & Trust Co. He was born on the Isle of Man, 63 years ago and came to America at the age of 14. He was employed by the Southern Railway in Cincinnati for 25 years.

WILLIAM HENRY WARRINGTON, president of the Vulcan Iron Works, Chicago, died Aug. 11.

WILLIAM BAXTER MYERS, treasurer Bethlehem Fabricators, Inc., Bethlehem, Pa., died Friday, Sept. 2.

Gain in August Steel Ingot Output

The steel ingot statistics of the American Iron and Steel Institute show that 30 companies, which in 1920 produced 84.20 per cent of the total, had an output in August of 1,138,071 gross tons as compared with 803,376 tons in July, and with 1,003,406 tons in June. The increase, which is the first since last October, was 334,695 tons or 41.6 per cent. Estimating the production of other companies on the basis of those reporting, the total output of ingots in August was 1,351,628 tons, or 50,060 tons per operating day, counting 27 working days in August, against an estimated total of 954,128 tons or 38,126 tons per day for the 25 operating days in July. This is an increase of 397,500 tons or 11,934 tons per day, representing 31.3 per cent increase in the rate of production. In the table below the output of Bessemer and open-hearth works is separated and the figures for 1920 by months are included:

Monthly Production of Steel Ingots by 30 Companies Which Produced About 84.20 Per Cent of Total in 1920—Gross Tons

	Open Hearth	Bessemer	All Other	Total
January, 1920..	2,242,758	714,657	10,687	2,968,102
February	2,152,106	700,151	12,867	2,865,124
March	2,487,245	795,164	16,640	3,299,049
April	2,056,336	568,952	13,017	2,638,305
May	2,251,544	615,932	15,688	2,883,164
June	2,287,273	675,954	17,463	2,980,690
July	2,135,633	653,888	13,297	2,802,818
August	2,299,645	695,003	5,784	3,000,432
September	2,300,417	693,586	5,548	2,999,551
October	2,335,863	676,634	3,485	3,015,982
November	1,961,861	673,215	3,594	2,638,670
December	1,687,162	649,617	3,586	2,340,365
Total, 1920...	26,197,843	8,112,753	121,656	34,432,252
January, 1921...	1,591,281	608,276	3,629	2,203,186
February	1,295,863	450,818	2,796	1,749,477
March	1,175,591	392,983	2,404	1,570,978
April	1,000,053	211,755	2,150	1,213,958
May	1,047,810	216,497	1,543	1,265,850
June	808,286	193,644	1,476	1,003,406
July	689,489	113,312	575	803,376
August	915,334	221,116	1,621	1,138,071

The August ingot production was at the yearly rate of 15,568,660 tons, counting 311 operating days to the year. This compares with a rate in July of 11,857,186 tons, in June of 14,824,437 tons, in May of 17,980,465 tons, in April of 17,242,773 tons and in March of 21,258,405 tons.

The increase of 397,500 tons in the estimated ingot output of all companies in August from that in July compares with an increase of 89,638 tons in the August pig iron output over that of July.

Sligo Furnace to Be Abandoned

The Sligo Furnace Co., St. Louis, Mo., recently blew out its charcoal furnace at Sligo, Dent County, Mo., and it is announced that the furnace will be abandoned. The shut-down is due to the exhaustion of the timber on which the company had depended for its charcoal supply. The uncut timber remaining in the district is too far distant to be transported advantageously. A hamlet of 400 persons has been built up about the furnace and now that the sole industry of the place has stopped most of the inhabitants will go to other districts. The buildings of the town are owned by the Sligo Furnace Co., including a school and a church. The Sligo furnace was built in 1880 by W. F. Crawford and others and was rebuilt in 1891. Its last relining was in 1919. The product was warm blast charcoal pig iron and the annual capacity was 20,000 tons. A considerable part of the output was taken by the American Car & Foundry Co.

The Society of Visual Education of Chicago is making a comprehensive series of motion pictures of milling machine operations in the plant of the Kempsmith Mfg. Co., Milwaukee. The films are being prepared for Governmental purposes for use in vocational education at rehabilitation and industrial schools.

An increase of 13,273 freight cars loaded with revenue freight during the week ended Aug. 27, as compared with the previous week, is shown by reports to the American Railway Association. The total for the week was 829,709 cars, the largest week's loading since Dec. 11, 1920, but 171,599 less cars than were loaded in the same week of August last year.

FAR EAST ACTIVE

British Colonies Interested in Railroad Material—Spanish Ore at $4.50 Per Ton Atlantic Port

NEW YORK, Sept. 13.—Export activity is still confined to Japan and other Far Eastern markets. Japanese purchases of cathode copper are still fairly large and there is an active interest in tin plate, black and galvanized sheets, wire and bars in small quantities. From the British colonies there is a continued brisk demand for railroad material and rolling stock. Several inquiries have recently appeared in the market for small tonnages of rail equipment and locomotives from these sources. Mining interests in South Africa, Australia and Mexico have recently shown an interest in light railroad equipment, locomotives and cars.

There have been some fairly large transactions in electric equipment to be used in the electrification of the Japanese railroads. Sheet buying, however, continues to lead in the Japanese purchases. One inquiry, being handled by a New York branch of a London export house, calls for a total of 1200 tons of black sheets and blue annealed ranging from No. 18 to No. 31 gage. Considerable difficulty has been encountered by this exporter in obtaining quotations from mills on the portion, totaling about 100 tons, of No. 30½ or No. 31 gage sheets 36 x 72 in., packed 13 to the bundle. Inquiry will probably be made in about six weeks by the purchasing agent of the George A. Fuller Co. of the Orient, New York, for a small tonnage of reinforcing bars for a $500,000 reinforced concrete building, which that company is erecting in Kobe, Japan.

Two new iron works are reported recently organized in Japan, the Niniwa Iron Works and the Tanaka Iron Works, both in Osaka, to manufacture machinery and boilers. The latter company is capitalized at 100,000 yen. The Aki Shoji Co., with a capital of 200,000 yen, has been organized in Osaka to deal in pig iron and steel. In view of the large stocks of pig iron in Japan, the stock of the Government iron works alone totaling 196,225 tons, it is reported by the *Far Eastern Review* that no more iron will be imported during the current year.

Chinese Locomotive Purchases

According to reports, the recent public opening of the tenders on 41 locomotives and 300 cars for the Chinese railroads, purchased by the Railway Car Loan Chinese Banking Group, was the first time that a government letting had been opened in public. Only two Mikado type locomotives were awarded to an American builder. These went to the American Locomotive Co. at $52,000 each. Thirty Prairie type locomotives were awarded to the Societe Belge pour L'exportation Industrielle, which represents the Forges Usines et Fonderies de Haine-St. Pierre, the Ateliers Metallurgiques Tubize and the Societe Franco-Belge a la Croyere in Belgium. The six English type locomotives were also placed with this company. The cars were awarded to Fearon, Daniel & Co., representing the Compagnie Centrale de Construction a Haine-St. Pierre.

European prices continue low. An exporter who submitted a bid on 1500 tons of steel bars for Japan based on 1.50c. per lb. Pittsburgh, lost the order. One exporter in New York reports recent sales of black sheets totaling about 350 tons to the Philippines and China.

In line with recent reports that foreign iron ore can be imported profitably, an exporter and importer in New York is now prepared to offer Garrucha ore from Garrucha, Spain, at about $4.50 per gross ton, f.o.b. cars New York. The analysis given is: Fe, 54.3; Mn, 1.77; S, 0.09; and P, 0.021.

Despite recent reductions of prices in Sweden, which have brought Swedish iron bars down to a price of about 6c. per lb. or less c.i.f. New York, carriers of stocks of this material in the United States see slight prospect of any but the most meager sales, as the demand is exceedingly light since the war period when it was impossible to obtain Swedish iron and consumers were forced to resort to substitutes.

British Iron and Steel Market

Continental Prices Still Stiffening—British Position Improves, But Orders Badly Needed

(*By Cable*)

LONDON, ENGLAND, Sept. 13.

Pig iron buyers are awaiting lower prices. There is a better demand for hematite, and more export inquiry, but the price has been reduced, owing to German competition.

Foreign ore is stagnant. Bilbao Rubio is nominally 28s. ($5.21) c.i.f. Tees.

British steelmakers are slightly better placed, but are still badly in need of orders. Continental prices are stiffening. German works are believed to have oversold, and trouble is expected in obtaining deliveries. German merchant bars are quoted up to £9 (1.49c. per lb.) f.o.b. for extended delivery. French merchant bars have sold at £8 2½s. (1.33c. per lb.) f.o.b., but £8 5s. (1.37c. per lb.) is now asked. Sellers of Belgian merchant bars ask up to £9 (1.49c. per lb.) f.o.b. Belgian joists (beams) are now sold at £8 5s. (1.37c. per lb.) f.o.b.

Inquiries are again coming from the Far East for important tonnages of steel wire, and German makers are full until January. Second-hands are being sold at £18 5s. (3.03c. per lb.) cost and freight to Japan, on basis of No. 8 gage, for December and January shipment.

Tin plates are easier, and there is little buying except by the Far East, which continues to make steady purchases. The Welsh output is from 25 to 30 per cent of capacity. Galvanized sheets are now sold by merchants to India at £19 15s. (3.28c. per lb.) f.o.b.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at $3.72 per £1 as follows:

Durham coke, delivered	£1	15					$6.51			
Cleveland basic	7	7½	&	£7	10*		27.45	&	$27.90	
Cleveland No. 1 foundry	7	0					26.04			
Cleveland No. 3 foundry	6	15					25.11			
Cleveland No. 4 foundry	5	19					22.13			
Cleveland No. 4 forge	5	17½					21.85			
Hematite	7	0*					26.04			
East Coast mixed	7	0	&	6	15*		26.04	&	25.11	
Ferromanganese	18	0	&	14	10*		66.96	&	53.94	
Rails, 60 lb. and up	10	0	to	14	0		37.20	to	52.08	
Billets	7	10	to	8	0		27.90	to	29.76	
Sheet and tin plate bars, Welsh	8	0	to	8	10		29.76	to	31.62	
Tin plate base box	1	1½	to	1	3		4.00	to	4.28	
							C. per Lb.			
Ship plates	13	0	to	14	0		2.16	to	2.32	
Boiler plates	18	0	to	19	0		2.99	to	3.16	
Tees	13	0	to	14	10		2.16	to	2.41	
Channels	12	5	to	13	15		2.03	to	2.28	
Beams	12	0	to	13	10		1.99	to	2.24	
Round bars, ¾ to 3 in.	12	0	to	12	10		1.99	to	2.08	
Galvanized sheets, 24 g.	20	0	to	20	10		3.32	to	3.40	
Black sheets	16	0					2.66			
Steel hoops	14	5	&	14	0*		2.37	&	2.32	
Cold rolled steel strip, 20 g.	26	10					4.40			

*Export price.

In the editorial on "The Inventor's Opportunity," in our issue of Sept. 8, the last sentence in the last paragraph but one, page 612, should have read: "Few inventions have a real commercial value until they have been put through a costly developing and refining process, and for that the buyer [of the patent] must pay."

The Chapman Valve Mfg. Co., Springfield, Mass., has put into effect a flat wage reduction of 10 per cent for office force as well as other employees. The company employs approximately 700 and has operated on full time without any reduction in its working force.

IRON AND INDUSTRIAL STOCKS

Substantial Recovery in Valuations Since Latter Part of August

That a more general feeling exists of business having reached the turning point is substantiated by the action of prices during the past week for iron and industrial stocks. In the more active securities, recoveries from quotations established in the latter part of August range from $5 to $20 a share. The rebound in inactive stocks naturally has been less. The fact remains, however, securities of practically every industry in the country are tending upward. To-day a small but real investment demand for securities exists, whereas a fortnight ago real liquidation was the keynote in the market for securities. The improvement in stock valuations apparently is largely based on the ability of industry to weather federal tax payments without disturbing the money market enough to influence the pending sale of Government securities; to the improved demand for iron and steel products; to the adjustment of labor to a basis where manufacturing costs, coupled with proposed protective tariffs, place our industries in a more favorable position as regards competition with foreign merchandise; to the recovery in the cotton market, which has revived business to some extent in the South; to Government financial aid to our farmers; and to the Government's efforts to place the railroads in a position to buy much needed equipment—all constructive business straws.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chalm. com.	32½- 33¾	Lackawanna Stl.	39 - 41⅞
Am. Can com....	26¾- 28⅛	Midvale Stl.....	24 - 25
Am. Can pf.....	80½- 80¾	Nat.-Acme	14 - 14½
Am. C. & F. com.	126½-133	Nat. E. & S. com..	33⅛- 34¾
Am. C. & F. pf..	108⅞-109	N. Y. Air Brake.	50 - 54⅞
Am. Loco com...	87⅝- 93½	Nova Scotia Stl..	23¾- 25½
Am. Loco. pf....	.. -104	Pressed Stl. com.	54 - 60
Am. Stl. Fd. com.	23⅞- 25	Pressed Stl. pf...	.. - 83
Am. Stl. Fd. pf..	.. - 80¾	Ry. Stl. Spg. com.	79¾- 84¾
Bald. Loco. com..	79⅞- 89½	Replogle Stl.....	22¾- 26½
Beth. Stl. com...	50 - 51	Republic com....	47½- 50½
Beth. Stl. Cl. B..	51 - 55	Republic pf.....	82 - 84¼
Beth. Stl. 8% pf.	98½- 99	Sloss com.....	35 - 37
Chi. Pneu. Tool..	50 - 52¼	Superior Stl.	29½- 30⅝
Colo. Fuel	24½- 25	U. S. Pipe com..	13½- 15¾
Cru. Stl. com....	57¾- 61⅜	U. S. Pipe pf....	41¾- 43
Gen. Electric....	121½-126¾	U. S. Steel com..	75⅞- 79
Gt. No. Ore Cert.	28 - 28¾	U. S. Steel pf....	108⅞-109¼
Gulf States Stl..	34¾- 40	Vanadium Steel..	30⅜- 35⅝
Int. Har. com...	77 - 81	Va. I. C. & Coke.	65 - 66
Int. Har. pf.....	.. -101	Westingh'se Elec.	43⅝- 45⅛

Industrial Finance

The Manufacturers Foundry Co., Waterbury, Conn., has issued $98,625 additional stock, increasing the outstanding capitalization to $295,875.

Stockholders of the Baush Machine Tool Co., Springfield, Mass., have voted to exchange the 12,500 outstanding common shares, par $100, for an equal number of shares of no par value, and to increase the common stock capitalization 37,500 shares, making the total authorized capitalization 50,000 shares of common stock, no par value, and 6100 preferred, par $100. Of the new common shares, 22,500 will be issued for all assets, except cash, of the Huron Metals Co.

The J. R. Stone Tool & Supply Co., 5009 Woodward Avenue, Detroit, has been adjudicated a bankrupt in the United States district court at Detroit. The first meeting of creditors will be held at 10 a. m., Sept. 13, at the office of the referees in bankruptcy in Detroit.

John F. Gerdis, trustee of the John Obenberger Forge Co., Milwaukee, bankrupt, who has been operating the plant by permission of the referee in bankruptcy for three months ending Sept. 12, has secured an extension of the permit to Oct. 31. His request was for a permit to operate until Jan. 12.

The A. P. Swoyer Co., merchandise stock, at 17 North Seventh Street, Philadelphia, has been purchased and the premises leased to the U. T. Hungerford Brass & Copper Co., 510 Arch Street, Philadelphia. Possession was taken by the Hungerford company Sept. 1.

The Motor Wheel Corporation, Lansing, Mich., has organized a steel wheel division, of which Roy F. Irvin has been made sales manager.

Office and Trade Changes

The Concord foundry, Elkhart, Ind., which has been owned by the Chicago Hardware Foundry Co. since Oct., 1919, will be known hereafter as Branch No. 6 of the Chicago Hardware Foundry Co.

The Worcester Brush & Scraper Co., Worcester, Mass., for many years located at Southbridge Street, has removed to a new plant at 456 Park Avenue. Edward F. Fletcher is president.

The Connecticut Iron & Metal Co., Bridgeport, Conn., has filed a preliminary certificate of dissolution. Claims should be sent to Harry Danberg, 86 Savoy Street, that city.

Houghton & Richards, 145 Oliver Street, Boston, dealers in steel, have incorporated under Massachusetts laws as Houghton & Richards, Inc., with a capital of $200,000. Bryan R. Houghton, Stoneham, is president, and George A. Mahoney, 33 Egremont Road, Brookline, treasurer.

Blake, Long & Co., 77 Hurley Street, Cambridge, Mass., sheet metal workers, has been taken over by the Blake-Long Corporation, capitalized for $70,000, which has been granted a charter to manufacture and deal in heating apparatus, ventilation equipment, blower systems, dust collectors and to do a general sheet metal and machine shop business. John J. Shamrock, 26 Taft Avenue, Point Shirley, Mass., is president, and James A. Blake, 132 Baldwin Street, Cambridge, is treasurer.

The National Chain Co. has moved from College Point L. I., to Terry and Cortland streets, Belleville, N. J. The floor space occupied in the new location is 30,000 sq. ft., with room for expansion immediately available.

The Universal Equalizer Co., Cincinnati, has moved from 132 Opera Place to 8 East Pearl Street.

The Springfield Motor Specialties Co., Inc., Springfield, Mass., has been taken over by the Springfield Motor Specialties Co., a Massachusetts corporation capitalized for $100,000. Charles P. Whitall, 1446 Longmeadow Road, Longmeadow, is president, and John G. Waddell, 497 Belmont Avenue, Springfield, treasurer.

The Garlock-Walker Machinery Co., Ltd., wood working and metal working machinery, Montreal, is now located at No. 356 Hingston Avenue.

The Betts Machine Co., Inc., Rochester, N. Y., has opened a Pittsburgh district sales office at 1915 Oliver Building, where direct factory representatives will supply sales and engineering service to the trade. Betts heavy duty machine tools were manufactured at Wilmington, Del., from 1861 until 1918, when the business and organization was moved to its present plant at Rochester.

The New York office of Joseph T. Ryerson & Son, 30 Church Street, has been removed to the Jersey City warehouse, Westside Avenue and Carbon Place, Jersey City. Hereafter, only a small office will be maintained at the former address, in charge of H. R. Heneage, general manager. The telephone number will remain unchanged, all calls for the New York office hereafter going directly to the Jersey City warehouse, with which the New York branch is connected by private wires.

The Texas Supply Co., dealer in oil well supplies, boilers, engines, pumps, tanks, etc., has moved its plant to Houston, Tex., at Lorain and Semmes streets. The company has been in the business of buying and selling oil well machinery for about twenty years at Beaumont, Tex.

J. E. Haetten & Co., dealers in machine tools, contractors' machinery, etc., have absorbed the Engineering Equipment & Supply Co., and have moved from 299 Broadway to new offices at 30 Church Street, New York. Officers of the consolidated company are J. E. Haetten, president; F. C. Young, formerly president of the Engineering Equipment & Supply Co., vice-president; Herbert Wilson, secretary and treasurer, and C. A. Bergmann, chief engineer.

The Reliance Machine & Specialty Co., Boston, has completed arrangements for combining with the Union Machine Co., Fitchburg, Mass. The Reliance Company's Jamica Plain plant will be moved at once to Fitchburg, and combined with the plant of the Union Machine Co., where self-lubricating bushings and bearings will continue to be made. Hereafter, all communications should be addressed to the Reliance Machine & Specialty Co., in care of the Union Machine Co., Fitchburg, Mass.

The name of the Grover Bros. & Wood, manufacturers of the Grover pneumatic tube carriers, has been changed to the Grover Co. The change will in no way affect the status of the company or its personnel. The offices will remain at 428 East Jefferson Avenue, Detroit.

Manning, Maxwell & Moore, Inc., machine tool dealers, 27 North Jefferson Street, Chicago, are adding a line of machinist's supplies to their stocks in that city.

Machinery Markets and News of the Works

PROSPECTS IMPROVING

Machine-Tool Trade Sees More Signs of Activity

Buying Is Limited, but There Are More Inquiries and Sentiment Is More Cheerful

Sentiment is steadily improving and the machine-tool trade is confident that the worst of the depression is past. While purchasers of machine tools are still in very small volume, there is in most centers an increasing number of live inquiries, on which action is expected soon if the improvement in the business situation which has manifested itself becomes more widespread.

The New York and Chicago markets have been very dull the past week, but improvement appears in other sections. The Ansted Engineering Co., Connersville, Ind., bought 10 tools at Cincinnati, the Detroit, Toledo & Ironton, the Ford road, has purchased several tools and the American Steel & Wire Co. at Cleveland has revived a list of eight large tools, mostly lathes.

The International Bed Corporation, New York, has inquired for several new or used tools. The Driver-Harris Co., Harrison, N. J., has asked for prices on a few machines, but may not buy immediately. The Brooklyn schools are considering the purchase of 60 or 70 lathes and bids will be asked for as soon as the appropriation is granted. The New York school board opened bids on Monday for some 400 items, mostly machine shop supplies, but including a number of machine tools.

In New England, prospects are improving. Inquiries are small, but come from diversified industries, indicating possiby a fairly general resumption of fall activity.

A noteworthy feature is the larger inquiry for cranes, particularly for locomotive cranes. Electrical equipment is also showing some activity. One company has booked 100 special electric motors for United States Navy submarines.

Railroad inquiry is not prominent, but the Big Four is expected to close shortly on several tools. A list from the Sewell Valley Railroad covering several tools is still pending at Pittsburgh.

Some makers of shapers have reduced prices about 10 per cent. A Cincinnati manufacturer of portable electric drills has reduced prices on some types 10 per cent. A New York State manufacturer of measuring blocks and gages has made reductions of 10 to 15 per cent. A St. Louis manufacturer of grinding and polishing machines has put reductions of 10 per cent into effect.

New York

NEW YORK, Sept. 13.

A few more prospects for machine tools are appearing, but generally they are rather indefinite, buyers being in no mood as yet to hasten purchases. The trade believes that the worst of the depression has passed and that a gradual improvement in demand may be expected shortly. The Driver-Harris Co., Harrison, N. J., which is installing new rolling mill equipment, has sought prices on a number of machine tools, but purchasing may be deferred. The International Bed Corporation, 50 East Forty-second Street, New York, has inquired for a drill press, shaper, engine lathe and several single-spindle drills, either new or used. The Brooklyn school board is considering the purchase of 60 or 70 lathes, but the appropriation has not yet been made and it is not known how soon bids will be asked for. The New York City school board took bids up to Monday, Sept. 12, on some 400 items, mostly machine shop supplies, but including a number of machine tools. Prices on shapers have been reduced about 10 per cent by some makers.

While the crane market in this district continues dull with the exception of the cranes for the Stapleton, S. I., piers closing Oct. 4, other districts report greater activity, largely confined to locomotive cranes, derricks and hoists. A large manufacturer of electric hoists has booked an order for 40 electric hoists for a Japanese shipyard. An inquiry has been issued by Asano Bussan Co., 165 Broadway, New York, exporter, for a floating grab transporter for handling coal from lighters with a capacity of 100 to 150 tons. A steam shovel is also included in the inquiry, which is for shipment to Japan for harbor use. The Betts Supply Co., Syracuse, N. Y., has requested quotations on a 15 to 20-ton locomotive crane, new or second hand. The Porcupine Co., Bridgeport, Conn., is reported to be on the point of closing its inquiry for cranes. The Mayer Coating Machine Co., Rochester, N. Y., has purchased a 3-ton, 16-ft. span, hand power crane from an unnamed builder and the Phoenix Utilities Co., 71 Broadway, New York, has purchased a 4-ton electric hoist from the Roeper Crane & Hoist Works.

Among recent sales are: Industrial Works, a 15-ton, 40-ft. boom locomotive crane to Dwight P. Robinson, Inc., New York, for export to Brazil; a 100-ton wrecking crane to the Sewell Valley Railroad, Rainelle, W. Va., and a 40-ton locomotive crane to the Western Maryland Railroad, Baltimore, Md.; Roeper Crane & Hoist Works, a 4-ton electric hoist to the Phoenix Utility Co., 71 Broadway, New York.

V. Lowener, 114 Liberty Street, New York, desires quotations on looms for weaving fence wire.

The Air Reduction Co., 120 Broadway, New York, is having plans prepared by Francisco & Jacobus, 511 Fifth Avenue, architects, for its new plant on property recently acquired on Ridge Avenue, Pittsburgh, for the manufacture of commercial oxygen, etc. It will be one and two-stories, 80 x 140 ft., and is estimated to cost about $250,000 with machinery.

The Westchester Buckle Mfg. Co., Mt. Vernon, N. Y., has been incorporated with a capital of $30,000 by K. Dauber, H. Brindberg and Horace London, 302 Broadway, New York, to manufacture buckles and other metal specialties.

The United Electric Light & Power Co., 130 East Fifteenth Street, New York, will build two one-story coaling towers, 67 x 187 ft. high, at its new generating plant on Walnut Avenue, 133rd to 134th Street, estimated to cost about $200,000 with machinery. A one-story meter house will also be erected.

M. Hulbert, Commissioner of Docks, foot of Battery Place, North River, New York, will receive bids until Oct. 4 for furnishing and installing cranes, elevators and electric power transmission equipment at piers 12 and 13, Stapleton, S. I. The work will include new boiler plants.

The Royal Metal Furniture Co., 125 Eighth Street, Brooklyn, has plans in preparation for a new one-story factory at Eighth Street and Third Avenue. William Higginson, 18 East Forty-first Street, New York, is architect.

The Flynn Specialties Corporation, New York, has been incorporated with a capital of $200,000 by J. F. and A. L. Flynn, and S. M. Platt, 908 Brook Avenue, to manufacture spark plugs, ignition equipment, etc.

A. L. Cadle, Superintendent of Public Works, Capitol Building, Albany, N. Y., will receive bids until Sept. 28 for one three-ton electric burtoning crane, to be installed on the Barge Canal, Mott Haven, New York.

The Dexter Folder Co., 28 West Twenty-third Street, New York, manufacturer of printing machinery and parts, has awarded contract to the H. K. Ferguson Co., 25 West Forty-third Street, for its plant addition at Pearl River, N. Y., estimated to cost about $100,000.

The Quid Mfg. Corporation, Bay Shore, L. I., has been incorporated with a capital of $1,000,000 by W. S. Johnson and M. J. Bunce, to manufacture engines, motors and kindred products. It is represented by A. F. Wells, Bay Shore.

The Rice Foundation, 12 East Eighty-seventh Street, New York, in co-operation with the city of New York, will build a new one-story power house, 73 x 73 ft. at Pelham Bay

Park, estimated to cost about $25,000. Plans have been completed.

The Robert Bosch Magneto Co., New York, has been incorporated with a capital of $250,000, to manufacture magnetos, spark plugs, starting and lighting systems. It is headed by the former officers of the Bosch Magneto Co., and has established offices at 123 West Sixty-fourth Street. Plans are under way for the early establishment of works in the vicinity of New York, and if possible an existing building will be acquired. Otto Heins is president; Guenther Jahn, treasurer, and Harvey T. Andrews, secretary. The last noted will also act as attorney for the company and maintains offices at 115 Broadway.

R. M. Mansfield, Inc., Babylon, L. I., has been incorporated with a capital of $30,000 by C. P. and S. A. Daly, and W. R. Cleary, Babylon, to manufacture electrical equipment, mechanical products, etc. It is represented by J. T. Cuff, 2 Wall Street, New York.

The Austin Estate, 2406 First Avenue, New York, has filed plans for a one-story forge shop, 50 x 100 ft., at 405 East 123rd Street.

The Ball Compass Co., New York, has been incorporated under Delaware laws with capital of $300,000 to manufacture marine and aeromarine instruments and other precision equipment. It is represented by the United States Corporation Co., 65 Cedar Street.

The Greenpoint Metal Covered Door Co., 13 McKibben Street, Brooklyn, has removed its plant to the factory at 538-44 Porter Street for increased operations.

Simon Gasner & Sons, 1870 Pitkin Avenue, Brooklyn, pipe, plumbing fixtures, etc., have awarded contract to the Turner Construction Co., 242 Madison Avenue, New York, for a new two-story and basement building, 105 x 260 ft., in the vicinity of their present works.

F. C. Schwab, New York, care of Simpson, Thacher & Bartlett, 62 Cedar Street, has leased for 21 years the United States Engineering Corps terminal property at Kearny, N. J., comprising about 30 acres with buildings totaling about 30,000 sq. ft. of space. The new owner is organizing a company to establish an industrial terminal at this location, with a portion of the property devoted to the manufacture of automobiles and automotive equipment. Other industrial plants will also be established.

The Star Machine & Novelty Co., Bloomfield, N. J., has been incorporated with a capital of $100,000 by John Brach, John Clonek and Anthony E. Zaga, 77 Mill Street, to manufacture electric motors and parts, and other machinery.

The Titan Miniature Lamp Co., Orange, N. J., has been incorporated with a capital of $100,000 by George Anderson, Dexter G. Dittell and Alfred J. Grosso, 308 Main Street, to manufacture electric lamps and other electrical products.

The White Metal Mfg. Co., Grand Street, Hoboken, N. J., has completed plans for a new one-story factory on Grand Avenue. Joseph C. Schaeffler & Co., 11 East Fifty-sixth Street, New York, are architects.

The M. W. Kellogg Co., 117 Westside Avenue, Jersey City, N. J., manufacturer of piping, power plant equipment, etc., has filed plans for a one-story addition on Hackensack Avenue, estimated to cost about $11,600.

The Christopher Marine Chain Propeller Corporation, Rahway, N. J., has been incorporated under Delaware laws with capital of $350,000 by Edwin S. and Charles F. Gale, Port Richmond, N. Y., and William B. Christopher, Rahway, to manufacture chains and other equipment for marine service.

The Borough Council, Sea Girt, N. J., will build a new one-story automobile service and machine repair works for municipal automobiles. Plans have been prepared.

A one-story power house, 75 x 80 ft., will be built by the Clark Thread Co., Clark Street, Newark, at its new bleaching works on Broad Street, Bloomfield, N. J.

The New Jersey Die Casting Co., Newark, has been incorporated with a capital of $310,000 by Gunnar Anderson, A. Roy Myers and James Beakbame, 16 Washington Avenue, Irvington, N. J., to manufacture die-castings, dies and other mechanical products.

The J. K. Osborne Mfg. Co., First Street, Harrison, N. J., manufacturer of metal products, has leased a new one-story factory at 14-20 Runyon Street, Newark, for the establishment of a new plant.

The Benjamin Products Corporation, Jersey City, N. J., has been incorporated with a capital of $1,000,000 under Delaware laws to manufacture rubber goods. It is represented by the Registrar & Transfer Co., 900 Market Street, Wilmington, Del.

The Board of Freeholders, Court House, Newark, has directed County Purchasing Agent George C. Bergen to advertise for bids for the construction of a new ash conveyor system and ash storage works at the County Isolation Hospital, Soho; and for the construction of a coal conveyor system and coal storage equipment at the Overbrook Hospital, near Verona, N. J.

The Reliable Japanning Co., Newark, has been incorporated with a capital of $25,000 by Frank Principe, Peter and Walter F. Lynch, 14 Ferdon Street, to manufacture japanned metal products, and electro-plated ware.

The Newark Spring Bed Co., 161 Prince Street, Newark, manufacturer of metal bedsteads, etc., has been directed by the city Zoning Commission to remove its works to another location. A period of 3 months has been granted in which to make the change.

The Gasifier Co., Newark, has been organized by Paul F. and George L. Reichella, 410 Trumbull Street, to manufacture gas machinery and other equipment.

The Auto Sales & Service Co., Newark, N. J., has filed plans for a one and two-story automobile service and machine works at 221-35 Frelinghuysen Avenue, 200 x 397 ft., estimated to cost about $208,000, including equipment.

A machine and repair shop will be installed in the building, 100 x 125 ft., now being erected by the Dorsey Motor Co., Perth Amboy, N. J., estimated to cost about $40,000.

The O'Connor Metal Barrel Co., Elizabeth, N. J., has been incorporated with a capital of $500,000 by H. A. Mullen, Frank J. Kelaber and William R. O'Connor, 11 Elmwood Place, to manufacture steel barrels and other metal containers.

Philadelphia

PHILADELPHIA, Sept. 12.

The Westinghouse Air Spring Co., 1428 Vine Street, Philadelphia, has leased property at 2336-38 Fairmount Avenue for new works. The building on the site will be demolished and a new structure erected.

I. Morris Hall, Inc., Philadelphia, has been incorporated under Delaware laws with capital of $100,000 to manufacture iron and steel products. It is represented by the Corporation Guarantee & Trust Co., Land Title Building.

The Quaker City Iron Works, Tioga and Edgemont streets, Philadelphia, has completed plans for a one-story boiler shop addition. Work will commence at an early date.

The Pneumatic Conveyor Co., Philadelphia, has been incorporated under Delaware laws with capital of $1,000,000 to manufacture pneumatic conveying equipment and other apparatus. It is represented by F. R. Hansell, Land Title Building.

The H. Brinton Co., 213 Race Street, Philadelphia, manufacturer of textile machinery and parts, is completing plans for a new four-story factory at Kensington Avenue and M Street, estimated to cost about $200,000, including machinery.

Paul Beyer, Philadelphia, operating a coppersmithing and other metal-working shop at 834 North Fourth Street, has filed plans for a new one-story works at 312-14 Fairmount Street.

Samuel W. Green, Philadelphia, has acquired the property of the Modern Machine Works Co., 2855-65 Ruth Street, Philadelphia, for $27,000, for the operation of a machine and metal-working plant.

The Montgomery Iron & Steel Co., Ninth Street and Montgomery Avenue, Philadelphia, will build a new crane runway at its plant.

The Electro Self-Winding Phonograph Co., Philadelphia, has been incorporated under Delaware laws with capital of $100,000 to manufacture talking machines and parts. It is represented by the Corporation Guarantee & Trust Co., Land Title Building.

The Bureau of Water, City Hall, Philadelphia, will install an electric traveling crane at the Shawmut pumping station. Machinery will also be installed at the repair shops of the bureau.

The Kuhn & Jacob Machine & Tool Co., Trenton, N. J., has been chartered under State laws to manufacture machinery and tools. The incorporators are Eugene and Walter Jacob, and George Kuhn, Prospect Street and the Pennsylvania Railroad.

The Trent Rubber Co., Trenton, N. J., has been incorporated with a capital of 10,000 shares of stock, no par value, by William V. Lee, I. M. Martino and Frank H. Thropp, Enterprise Avenue. It will take over and operate the plant of the Trenton Rubber Co., which has been under a receivership for about a year.

A new one-story power house will be erected by S. W. Evans & Son, 4623 Paul Street, Philadelphia, manufacturer of metal products, in connection with the construction of an addition, estimated to cost about $125,000.

The Hurley Motor Co., Broad and Race Streets, Phila-

delphia, is demolishing the building at 219-25 North Broad Street, preparatory to the erection of a new 10-story and basement plant on the site, 80x100 ft., estimated to cost about $350,000. John S. Hurley is president.

A new one-story power house will be erected by the Clifton Yarn Mills, Clifton Heights, Pa., 25 x 52 ft., in connection with other extensions.

The Hydro United Tire Co., Pottstown, Pa., will build an addition to its plant, estimated to cost about $250,000 with machinery.

The Keystone Supply & Mfg. Co., 427 North Ninth Street, Philadelphia, manufacturer of steam equipment, plumbing hardware and fixtures, etc., has completed plans for new works at Bethlehem, Pa., estimated to cost about $175,000.

The Floyd-Wells Co., Royersford, Pa., manufacturer of stoves, ranges, etc., is having revised plans prepared for its two-story addition, 32 x 120 ft. A. S. Kepner, 121 Hanover Street, Pottstown, Pa., is architect.

The Wat-R-Oil Burner Corporation, Harrisburg, Pa., has been incorporated under Delaware laws to manufacture oil-burners, heating equipment, etc., with capital of $2,000,000. It has perfected arrangements with the Harrisburg Corporation for the manufacture of its products until a new plant can be constructed.

The State Board of Public Grounds and Buildings, Harrisburg, Pa., has taken bids for a new one-story automobile service and repair works for State automobiles and trucks, estimated to cost about $130,000. A second unit, to cost approximately a like amount, will be constructed later. T. W. Templeton is superintendent of the department.

The Lower Paxton Township School Board, Lower Paxton Township, Pa., has had plans prepared for the erection of a one-story vocational school at Linglestown, to cost about $50,000. It will include machine shop, metal-working department, electric department, wood-working, etc. Frank F. Fahnstock, Jr., Patriot Building, Harrisburg Pa., is architect.

The Blue Ridge Corporation, Roaring Creek, Pa., will build a one-story machine and repair shop in connection with a new food canning plant.

The Pneumatic Conveyer Co., Philadelphia, has been incorporated under Delaware laws with capital of $1,000,000 to manufacture mechanical conveyor systems, etc. It is represented by the Corporation Guarantee & Trust Co., Land Title Building.

The Argo Paper Mills Co., Gloucester City, N. J., has been organized to operate a plant at the Argo mills, for the manufacture of news-print paper. The company is formed under Delaware laws, and is headed by Frank J. Hummell, owner of the property. It is proposed to have the mills equipped and ready for operation by the close of the year.

New England

BOSTON, Sept. 12.

With few exceptions local dealers are working on prospects that apparently have considerable promise and in a number of instances it is believed actual transactions will be consummated within the next fortnight. Degrees of activity in this respect vary from one or two prospects to several. Inquiries concern new as well as used machinery and come from diversified industries, with piston ring and other automobile parts manufacturers and electrical contractors the most numerous.

As far as can be learned no change in prices has been made, but a maker of boring mills intimates a revision to be announced in the near future. The General Electric Co., West Lynn, Mass., has purchased some gear testing machinery and three additional sets of Pratt & Whitney precision blocks. Two New England railroads are negotiating on several pieces of shop equipment; the Watertown Arsenal, Watertown, Mass., wants three gear cutters, and the city of Boston is inquiring for a gear driven universal milling machine. One dealer reports sales of two 16-in. x 8-ft. gap lathes to a Brockton company and a 13-in. x 5-ft. engine lathe to a Rutland, Vt., manufacturer. School jobs are developing more slowly than anticipated. One of the largest projects of this nature has been postponed for four or five months and one of the largest textile machinery makers has put off purchases of a few needed tools. The Hartford fire board has asked for an appropriation to purchase a small crane, lathes and other equipment for its machine shop.

The auction sale of the National Products Mfg. Co., Inc., 153-155 Washington Street North, Boston, on Sept. 8 was well attended. There is a shortage of used presses in this market and bidding for those at the sale was active and good prices resulted. Milling machines, lathes and the like went slowly at prices considerably less than 50 per cent of the replacement value. The outstanding feature was the sale of two Waterbury Farrel Foundry & Machine Co. No. 106 practically new six plunger automatic eyelet machines, having a replacement value of $2,360 each, which were sold for $1,012.50 each, and a similar machine, but not in as good conditions, sold for $812.50. Bidding for these three machines was especially keen.

Builders of motors report good sales and prospects in the textile and shoemaking industries.

The American Steel Ladder Co., Sanford, Me., steel ladders, etc., is to erect a two-story plant.

A permit has been issued the Ramsdell Specialty Co., 667 West Boylston Street, Worcester, Mass., to rebuild a two-story factory, 50 x 60 ft.

The Reliance Machine & Specialty Co., 101-103 Green Street, Boston, oilless bushings and bearings, etc., has completed arrangements for combining with the Union Machine Co., Fitchburg, Mass.

A Massachusetts charter has been granted the Safe Auto Lock Co., Boston, capitalized for $150,000. Stanley B. Andrews 44A Linden Park Street, Roxbury, Boston, is president, and Charles F. A. Smith, 181 Beach Street, Wollaston, Quincy, Mass., treasurer.

Isaie Laplante, 586 Mount Hope Avenue, Fall River, Mass., is president, and Louis A. Cadoret, 156 Broad Street, Pawtucket, R. I., treasurer of the Universal Shuttle Spring Co., Fall River and Pawtucket, a $99,000 corporation recently granted a Massachusetts charter.

Plans are on foot to move the Philadelphia plant of the Standard Steel & Bearings Corporation to Plainville, Conn., as soon as business conditions warrant. Ball bearing machinery installed in the New Haven plant is being moved to Plainville.

The Grip Tool & Machine Co., Worcester, has been granted a Massachusetts charter to carry on a general manufacturing and machine shop business. Carl G. Grip, 17 Paine Street, is president, and John F. Hjort, 1 Mars Street, treasurer. The company is capitalized for $50,000.

The Sachem Mfg. Co., Inc., Brockton, toys, is occupying a new plant on Pearl Street having 7646 sq. ft. of floor space. Ola F. Smith, 794 Pearl Street, is president; Ralph H. Waite, 7 Greenwood Road, vice-president, and B. E. Holmberg, 25 Riverview Street, treasurer. The company recently incorporated under Massachusetts laws with a capital of $40,000.

The Aircraft Construction-Transportation Corporation, New Haven, Conn., recently organized under Delaware laws, has taken over the Connecticut Aircraft Co., and local plant. It will specialize in the construction of airplanes, concentrating production on those of rigid character. S. C. Morehouse is president; Ralph H. Clark, treasurer, and Paul Webb, secretary.

The Excellight Co., Bristol, Conn., has been incorporated with a capital of $25,000 by Rudolph Stern, F. N. Manross and Hjalmar Geruldsen, 28 Merriman Street, to manufacture electric lamps and kindred products.

New coal-handling and conveying equipment, and other mechanical apparatus will be installed at the plant of the City Fuel Co., Quincy, Mass., in connection with rebuilding the works at an estimated cost of $100,000.

A two-story power house addition, 95 x 105 ft., estimated to cost about $75,000, will be constructed by A. F. Robinson, Cambridge, Mass., at his plant at Binney and Second streets.

The Marcy Tool Works, Putnam, Conn., has been organized with a paid-in capital of $31,000 to manufacture tools and other mechanical specialties. A. W. Marcy is president and treasurer.

The Kescot Mfg. Co., 67 Clifford Street, Providence, R. I., manufacturer of metal products, has acquired property at Clifford and Page Streets for extensions.

The Connecticut Light & Power Co., New Britain, Conn., has commenced an expansion and improvement program to cost about $250,000. It will include the installation of new equipment at the Black Rock power plant and a new power distributing plant at New Britain.

Dragat & Troubman, 340 Windsor Avenue, Hartford, Conn., have had plans prepared for a new three-story automobile service and repair works, 95 x 100 ft., on Windsor Avenue, to cost about $100,000.

The American Electric Service & Maintenance Co., 51-57 Taylor Street, Springfield, Mass., operating a plant for machine and electrical repair work, parts manufacture, etc., is arranging for the removal of its plant to a new building on Liberty Street, to provide about double the amount of floor space now occupied. Additional equipment will be installed.

The W. J. Hyland Mfg. Co., 151 Dwight Street, New London, Conn., manufacturer of pipe, plumbing fixtures, heat-

ing apparatus, etc., has plans under way for the erection of a new three-story building, 47 x 85 ft., on Liberty Street.

The Utilities Mfg. Corporation, New Haven, Conn., has been incorporated with a capital of $50,000 by T. F. Cooney, Cheshire, Conn.; J. D. Beecher and W. B. Turley, 865 Chapel Street, New Haven, to manufacture metal specialties, including can-openers, metal button hooks, etc.

The B. F. Zimmerman Mfg. Co., Inc., New Haven, Conn., has been incorporated with a capital of $150,000 by Harry A. Waldron and B. F. Zimmerman, 2088 Chapel Street, to manufacture tools, automobile equipment, etc.

Buffalo

BUFFALO, Sept. 12.

The Ojax Battery Co., Canaseraga, N. Y., has plans under way for the erection of the second unit of its plant for the manufacture of electric storage batteries. The initial unit is nearing completion and machinery will be installed at an early date.

Fire Sept. 7 destroyed a portion of the oil manufacturing plant of the Frontier Mfg. Co., Erie Avenue, Tonawanda, N. Y., with loss estimated at about $30,000.

The Park Metal Ware Co., Orchard Park, N. Y., has been incorporated with a capital of $50,000 by J. and A. Zilliox and J. Petrie. Orchard Park, to manufacture metal goods, automobile parts, etc. It is represented by A. L. Steatemeier, Hamburg, N. Y.

The Cady Products Co., Canastota, N. Y., has been chartered under State laws to manufacture automobile and machine parts, etc. The incorporators are G. B. Cady, A. Case and L. D. Williams. It is represented by D. F. Wallace, Canastota.

The Depew & Lancaster Light, Power & Conduit Co., Lancaster, N. Y., is planning the erection of a new electric plant to replace the present power house at East Aurora, N. Y., formerly operated by the East Aurora Electric Light Co., and recently acquired. Other improvements and extensions will also be made in this section.

Henry Landsheft, 1202 Jefferson Street, Buffalo, manufacturer of automobile bodies, will take bids at once for a one-story addition, adjoining the present works, 35 x 100 ft., estimated to cost approximately $25,000.

G. P. Marton, Harrisburg, Pa., and Levi S. Chapman, 321 Westcott Street, Syracuse, N. Y., are negotiating for the purchase of the plant of the Dunkirk Axle Co., Dunkirk, N. Y., which has been closed for several months. The new interests propose to organize a company and operate the works for the manufacture of axles and kindred products.

The Fedders Mfg. Co., 57 Tonawanda Street, Buffalo, has arranged for the operation of a department for rebuilding and repairing automobile radiators, etc.

The Cortland Grinding Wheel Corporation, Cortland, N. Y., has filed notice of dissolution under State laws.

Cleveland

CLEVELAND, Sept. 12.

Some machine-tool dealers are working on a few more live inquiries than they have had for some time and an improved feeling is noted in the trade. Sales are generally confined to the smaller sizes of machines with most of the orders coming from other industrial centers, the local market being almost lifeless. The American Steel & Wire Co. has revived an inquiry for eight large machines, mostly lathes, on which it is asking new quotations. This inquiry was first put out in July last year. The Detroit, Toledo & Ironton Railroad, now owned by Henry Ford, has purchased a few tools recently and is expected to be in the market shortly for additional equipment.

The management of one local machine tool plant, which was scheduled to resume operations Sept. 12, has decided to remain closed for an indefinite period. Another plant which has been shut down for some time has resumed operations, but may again stop production. The most encouraging feature of the market locally is an improvement in the demand for machine shop supplies.

The only price change reported is a reduction of approximately 10 per cent by a St. Louis manufacturer of grinding and polishing machinery.

The Minerva Engine Co., 1916 East Sixty-first Street, Cleveland, manufacturer of truck and tractor engines, has purchased a 10-acre site on Dunham Road and the Pennsylvania Railroad on which is a factory providing 20,000 sq. ft. of floor space. The building is being equipped for the manufacture of the company's line of engines and additional units will be erected later. C. S. Goby is president and R. L. Long, secretary.

The S. H. Vehicle Co., 3291 East Sixty-fifth Street, Cleveland, has had plans prepared for a one-story factory, 40 x 90 ft., to manufacture parts for wagons.

The Rundle Mfg. Co., which for the past six years has been manufacturing children's vehicles in Columbus, Ohio, is planning to move to Fremont, Ohio, where enlarged capacity will be provided. George W. Rundle is head of the company.

The Williamson Hydraulic Clutch Co., Mt. Vernon, Ohio, has appointed an executive committee of which Edgar Thomas is chairman, to have charge of the management of the company's business. It plans to place a new type of clutch on the market shortly.

The Unitile Co., Uhrichsville, Ohio, has been reorganized as the Donahey Power & Products Co., with a capital stock of $2,000,000 in preferred stock and $2,000,000 common stock, and plans to move to a new location and to erect works for the manufacture of sewer pipe, brick and other products. A. V. Donahey, New Philadelphia, Ohio, is president, and W. E. Knight, Cleveland, secretary. The general offices will be in the Hanna Building, Cleveland.

The Sterling Brass Co., 4610-12 St. Clair Avenue, Cleveland, will hold in abeyance the erection of its new two-story foundry and machine shop, 145 x 200 ft., at St. Catherine and Ninety-third streets, estimated to cost $60,000.

Chicago

CHICAGO, Sept. 12.

Machine-tool inquiries have decreased almost to the vanishing point and store calls are infrequent. Such sales as there are cover used equipment more largely than new. No action has been taken on the pending Santa Fe and Rock Island lists, and no other railroad business is in sight. Auction sales of equipment belonging to industrial concerns in financial difficulties continue to be held without stirring up undue interest among either dealers or users. In some cases bids have been so few that machines have been sold at unusual prices. At a recent sale of the assets of the Security Tool Works, Chicago, a practically new six-spindle drill press, listed by the maker at over $1,000, f.o.b. factory, brought only $210. On the other hand, a number of other machines went at fairly high prices.

A Cincinnati manufacturer of portable electric drills and grinders has reduced prices on some types about 10 per cent. A New York State maker of measuring blocks and gages has announced a reduction of from 10 to 15 per cent.

The crane market is showing some activity after several months of quiet. The Marquette Electric Engineering Co., Chicago, has placed an order for a 20-ton electric overhead traveling crane, and the Chicago, Burlington & Quincy Railroad has bought a 10-ton crane. Negotiations are active on a number of cranes wanted by the Atchison, Topeka & Santa Fe Railroad for its Albuquerque, N. M., shops.

The Raico Mfg. Co., manufacturer of electrical railroad supplies, 849 West Washington Boulevard, Chicago, has purchased a one-story factory, 100 x 180 ft., at the corner of Lake Street and Albany Avenue, and plans to occupy the premises Oct. 15.

Holmquist & Co., manufacturers of ladders and household woodenware, 82 West Washington Boulevard, Chicago, have purchased a two-story factory, 50 x 125 ft., at 2556-62 Armitage Avenue.

The Warmick Type-O-Phone Mfg. Co., 3501 Wabash Avenue, Chicago, has been incorporated with $40,000 capital stock by William M. Houston, William L. Ford and Henry W. Warmick to manufacture dictation machines.

The Du-Al Co., 1810 Belle Plaine Avenue, Chicago, has been incorporated with $100,000 capital stock by A. K. Hansen, E. H. Lowell and Karl Mockenhaupt to manufacture safety razor blade sharpeners. It has started operations.

The Safstrom Mfg. Co., 6706 South Chicago Avenue, Chicago, has been incorporated with $30,000 capital stock to manufacture timers for Ford cars and other automotive parts and accessories, and has commenced production. The incorporators include John B. Bieco, G. A. Safstrom and E. V. Safstrom.

The Ellison Engineering & Furnace Co., 810 South Second Street, Maywood, Ill., has been incorporated by Earl J. Ellison, W. Scott Hodges and Robert F. Bradburn to manufacture heating, ventilating and drying systems. For a time its manufacturing operations will be confined to assembling parts made under contract in other plants.

The Illinois Penitentiary, Joliet, Ill, will take bids through Zimmerman, Saxe & Zimmerman, 64 East Van Buren Street, Chicago, until Sept. 30, on a one-story power house, 70 x 80 ft., to cost $45,000.

The city of Des Moines, Iowa, will build a two-story high school, 240 x 360 ft., including boiler plant and manual training department, at South West Ninth Street and Loomis Street. G. L. Garton, secretary of the school board, is receiving bids on the structure, the estimated cost of which is $700,000.

The J. Ryan Foundry Co., 506 Forty-first Street, Rock Island, Ill., will erect a two-story plant, to cost $50,000.

The Missouri, Kansas & Texas Railway will receive bids until Sept. 15, on a two-story machine shop, 50 x 150 ft., at Parsons, Kan., to cost $50,000.

The Sheridan-Wilson Garage Co., 64 West Randolph Street, Chicago, is taking bids for a new three-story service and repair works, 75 x 200 ft., at 4616-32 Winthrop Avenue, estimated to cost about $200,000, with equipment. W. G. Uffendell, 39 South State Street, is architect.

The Cross Mfg. Co., Woodstock, Ill., has been incorporated with a capital of $100,000 by Harry Cross, George L. Murphy and Emil Wittenberg, Woodstock, to manufacture automobile parts and equipment, and other products.

The Davenport Ice Co., First and Myrtle streets, Davenport, Iowa, is planning the erection of a new two-story ice-manufacturing plant, estimated to cost about $75,000.

The Common Council, Hecla, S. D., has completed plans for a new municipal electric power house. W. H. Higby is city clerk.

The Chicago, Rock Island & Pacific Railroad Co., 139 West Van Buren Street, Chicago, has awarded a contract to Joseph E. Nelson, 3240 South Michigan Avenue, for a new one-story engine house and repair shop at Amarilla, Tex.

Cincinnati

CINCINNATI, Sept. 12.

Sentiment in the machinery market is steadily improving, and most manufacturers and dealers are confident that the worst of the depression has been passed. A number of orders have been placed the past week, the largest being 10 machines by the Ansted Engineering Co., Connersville, Ind. Included in the list were seven gear hobbers, two drilling machines and one milling machine. Other orders were mostly for single tools. Some business is being done on a trading basis, the customer taking a new machine and giving in part payment used equipment. The Big Four Railroad has not yet taken action on its list for the Beech Grove shops, though negotiations were resumed last week. It is said that buyers are not meeting with much success in securing lower quotations than have already been made against inquiries, manufacturers insisting that prices have been cut to the lowest possible point. Several shops are putting on a few additional men, and while stocks in some instances are large, they are not well assorted, and for this reason operations will be resumed on a part time scale.

The Cincinnati Traction Co., Cincinnati, has awarded to the Hazen-Jones Co. the general contract for an electric transformer house on Walnut Street of concrete and steel. A number of other stations will also be built.

To take care of increasing business, the Enterprise Brass & Plating Co., Cincinnati, has increased its capital stock from $25,000 to $100,000. No extensive additions to the plant are contemplated at present.

The Elcon Engineering Co., Franklin Building, Columbus, Ohio, has been awarded contracts covering the design and installation of a coal-crushing and handling plant for the new power house at Ohio State University.

The Universal Equalizer Co., Cincinnati, has been incorporated with a capitalization of $25,000 by W. J. McCauley, Sam Schwartz, Oscar Schwartz, Joseph F. Pflum and William Thompson to take over as a going concern the business of the same name at 8 East Pearl Street.

The Dayton, Toledo & Chicago Railroad Co., Dayton, Ohio, is erecting a round house at Celina, Ohio, 80 x 100 ft. A repair shop will also be built.

The Allsteel Ridewell Tire & Rubber Co., 513 Lindsay Building, Dayton, Ohio, has completed plans and proposes to commence construction during the fall for its new automobile tire manufacturing plant on South Dayton Street, three stories and basement, 125 x 300 ft., and estimated to cost close to $500,000 with machinery. A. Huetter is president and general manager.

The Columbus Forge & Iron Co., West First Street, Columbus, Ohio, has taken bids for a new one-story and basement addition, 70 x 200 ft., and will award contract at an early date.

The Globe Metallic Works, 1126 Gact Street, Cincinnati, has awarded a contract to F. Mersch & Sons, 1037 Wade Avenue, for a new one-story plant at 917-19 State Avenue, estimated to cost about $15,000.

Detroit

DETROIT, Sept. 12.

The H. M. Reynold Asphalt Shingle Co., Grand Rapids, whose plant was recently destroyed by fire, will start the immediate erection of a new factory.

Work on the new municipal electric light and power plant for Lansing, Mich., will begin within the next 30 days.

The Atlas Crucible Steel Co., Dunkirk, N. Y., will open a warehouse at Marysville, Mich., and install high speed and carbon steel. It is contemplating the erection of a plant there as soon as conditions warrant.

The Ireland & Matthews Mfg. Co., Detroit, will soon increase its capitalization by issuing $700,000 additional stock to be used in plant and equipment extensions.

John Doran, Detroit, care of I. M. Lewis, 503 Congress Building, architect, has plans under way for a new one-story machine shop at Epworth Boulevard and Tireman Avenue, estimated to cost about $20,000.

The McRae Steel Co., Detroit, has been incorporated with a capital of $30,000 by Herbert C. Shotwell, D. Shepard Shine, Jr., and Kenneth C. McRae, 2714 Pingree Avenue, to manufacture iron and steel products.

R. J. Teetor, Muskegon, Mich., has plans under way for a one-story foundry at Cadillac, Mich., to manufacture iron and steel castings, estimated to cost about $50,000. Frank D. Chase, Inc., 645 North Michigan Avenue, Chicago, is engineer.

The Marcellus Corporation, Marcellus, Mich., has been incorporated with a capital of $150,000 by Frank Patch and B. C. Pittman, Marcellus, to manufacture gas and oil-burning engines, pumping machinery, etc.

The Department of Motor Transportation, City Hall, Detroit, has preliminary plans under way for a three-story automobile service and repair plant for municipal automobiles, 200 x 350 ft., estimated to cost about $400,000 with equipment. W. Helmboldt is superintendent in charge.

The Van Atlas Corporation, Detroit, has been chartered under State laws to manufacture automobile parts and accessories. The incorporators are Oscar E. Rasch, James H. White, and George F. Balk, 622 West Foreshaw Avenue.

Pittsburgh

PITTSBURGH, Sept. 12.

Inquiries for cranes are more numerous than in several weeks, even though actual sales still are conspicuous by their absence. The Truscon Steel Co., Youngstown, Ohio, has a request out for bids on a 5-ton low head room crane, with 37-ft. 9-in. span; the National Radiator Co. has inquired for a 5-ton, 3-motor, 37½-ft. span overhead for its New Castle, Pa., works, and the National Tube Co. is seeking a 10-ton or 15-ton, 71-ft. 4-in. span, and a 7½-ton stationary jib crane for its Christy Park works, McKeesport, Pa. It is expected that the Bessemer Gas Engine Co., Grove City, Pa., will soon close for a 5-ton crane for which it inquired a few weeks ago.

The machine tool market still is limited as to sales and inquiries, except for individual tools, are not numerous. So far as can be learned the Sewell Valley Railroad, Ranelle, W. Va., has not yet closed against a list issued about two weeks ago calling for a 1200-lb. steam hammer; a 20-in. engine lathe, with power cross feed and taper attachment to swing 8-ft. between centers, or the same of turret type with turret on carriage, belt driven; one No. 2 or No. 3 universal milling machine, belt driven; a 24-in. high-speed upright drilling machine, back geared, belt driven; a 58-in. or 68-in. 250-ton wheel press, inclinable type, belt driven, and a 60-in. belt driven lathe to turn straight connectors; also two Shay type drivers.

Some activity is noted in electrical equipment, the Ridgway Dynamo & Engine Co., Ridgway, Pa., having recently taken 100 special electric motors for installation in United States submarines, while the General Electric Co. recently was awarded by the Aluminum Co. of America, for installation at Baden, N. C., a 7000-kw. generator, it being the purpose of the Aluminum Co. to develop power for use in its own plant and to sell the surplus to the Southern Power Co.

The Conewango Car Co., Warren, Pa., recently organized under Delaware laws with capital of $550,000, to manufacture freight cars, tank cars, etc., taking over the plant of the Allegheny Steel Car Co. at this location, will break ground at once for a new one-story car repair shop, estimated to cost about $25,000. It will replace a structure recently destroyed by fire.

The Senior Mfg. Co., Pittsburgh, is being organized by J. C. and C. C. Kohne, and D. L. Taylor to manufacture hardware, grinding and sharpening devices, and other special-

ties. It is represented by George Y. Meyer, 1302 Berger Building. Application for a State charter will be made Sept. 26.

The Pittsburgh Engineering, Foundry & Construction Co., Pittsburgh, is being organized by N. J. Wallace, F. C. McCutcheon and J. B. Orr, to manufacture castings and other engineering specialties. Application for a State charter will be made Sept. 27. J. B. Orr, Farmers' Bank Building, represents the company.

The Safety Appliance Corporation, Pittsburgh, has been incorporated under Delaware laws with capital of $200,000, to manufacture drop forgings, hardware products, appliances, etc. The company is represented by the Capital Trust Co., Dover, Del.

The Union Ice Co., Pittsburgh, has completed plans for a new two-story plant, 70 x 160 ft., on Beaver Avenue, estimated to cost about $100,000.

Thomas Holden, Bradford, Pa., has plans under way for a one-story forge shop.

The Tech Food Products Co., Thirty-sixth and Butler streets, Pittsburgh, is planning for enlargements in its cold storage and refrigerating plant to increase the capacity from 700,000 cu. ft. to 2,200,000 cu. ft. Three new electrically operated ice machines will be installed, with auxiliary power equipment.

The P. V. & K. Coal Co., 242 Main Street, Monongahela, Pa., E. H. Robinson, treasurer and general manager, is planning for the installation of new electrical machinery and mechanical equipment at its coal properties at Arnettsville, W. Va.

The Safety Appliance Co., Huntington, W. Va., has been organized to manufacture safety equipment. W. K. Cowden and H. C. Duncan, Jr., Huntington, head the company.

The Hackett Coal Co., Cedar Grove, W. Va., has completed plans for the construction of a new tipple at its property. Other mechanical and electrical equipment will be installed.

The Miller Glass Feeder Co., Wheeling, W. Va., has been chartered under State laws to manufacture feeders for glass machinery and similar glass-making equipment. The incorporators are George A. Blackford, Wheeling, and A. Tegarden, Martins Ferry, Ohio.

Baltimore

BALTIMORE, Sept. 12.

A new power plant will be erected by the Board of Directors, St. Charles College, Catonsville, near Baltimore, in connection with other buildings, estimated to cost about $180,000.

The Universal Products Co., Inc., 1621 Cathedral Street, Baltimore, has been incorporated with a capital of $50,000 by L. Sterling Wagner, Edward L. Quirk and Harry L. Price, to manufacture automobile equipment, bodies, etc.

Fire, Aug. 24, destroyed the main building at the plant of the Thomasville Chair Co., Thomasville, N. C., with loss estimated at about $30,000, including equipment.

The Anheuser Busch Co., Norfolk, Va., with headquarters at St. Louis, has plans under way for an addition to its local ice and cold storage plant, estimated to cost about $250,000 with equipment. Ophuls, Hill & McCreery, Inc., 112 West Forty-second Street, New York, is engineer.

The Winchester Cooperage Co., Winchester, Va., is planning to rebuild the portion of its plant destroyed by fire, Sept. 1, with loss of about $60,000, including equipment. W. A. Higgs heads the company.

The Forbes Aluminum Products Co., Wilmington, Del., has been incorporated with a capital of $4,500,000 to manufacture cooking utensils, screens, etc. The Corporation Trust Co, duPont Building, represents the company.

The Edward Tin Splitting Machine Co., Wilmington, Del., has been incorporated with a capital of $300,000 to manufacture machinery. It is represented by the Capital Trust Co., Dover, Del.

The Raven Red Ash Coal Co., Richlands, Va., is planning for the construction of a new coal tipple at its properties. Construction will commence at an early date.

The Hughes Engineering & Construction Co., Baltimore, has leased property at 316 West Redwood Street, for the establishment of a new plant.

The Columbus Sewer Pipe Co., Columbus, Ga., is planning to rebuild its plant, recently destroyed by fire, with loss estimated at about $75,000. Judson C. Buchanan is manager.

The North State Power Co., Raleigh, N. C., has been incorporated with a capital of $250,000 to operate a local power plant in this section. The incorporators are L. H. Crouch, Raleigh; J. B. Johnson, Cardenas, N. C.; and A. J. Blabock, Willow Spring, N. C.

Electric plant improvements and extensions to cost about $300,000 will be made by the city of Kinston, N. C.

The Midway Foundry Co., Burlington, N. C., has been organized with $25,000 capital stock and is arranging for the establishment of a plant. J. G. King is manager.

The Safety-First Patch Co., 1520 Fidelity Building, Baltimore, has been incorporated with a capital of $100,000 by George E. Thrall, Hugh T. Aldrich and Harvey R. Baker, to manufacture rubber specialties.

The Automatic Clothes-Brushing Machine Co., Harrisonburg, Va., has been incorporated with a capital of $50,000 to manufacture special machines and parts. Julius Wise, Harrisonburg, is president, and W. D. Mitchell, secretary.

The National Bean & Pea Picker Corporation, Atlanta, Ga., has been incorporated with a capital of $250,000 by E. E. Davis and W. A. Sims, Atlanta, and C. W. Rice, Hartwell, Ga., to manufacture harvesting machinery.

Milwaukee

MILWAUKEE, Sept. 12.

The demand for machine tools continues spasmodic and from scattered sources, but is assuming volume. Inquiry likewise is increasing, the past week having developed a moderate number of requests. The experience of sellers has been that considerable inquiry is made merely to obtain some tangible basis for figuring requirements, with no prospect of immediate buying. Nevertheless, the quantity of business growing out of current inquiry is regarded as a healthy sign of the improvement believed to be in the foreground. Local automotive parts makers have been buying some new tools, placing orders generally in single machines or lots of two or three. Tool production in this territory is fluctuating considerably, some shops have enlarged operations since Sept. 1, while others have reduced forces. The Gisholt Machine Co., Madison, Wis., closed Sept. 1 after running on a three-day-a-week schedule for some time past, but expected to reopen this week with the previous force of about 500 men.

The Victor Krefl Mfg. Co., Two Rivers, Wis., manufacturer of automotive accessories and equipment, has decided to transfer its operation to Eagle River, Wis., where local capital has absorbed a requisite interest to insure the relocation. The Krefl company has been in business about a year and recently was obliged to relinquish its leased quarters in Two Rivers. A new factory costing about $30,000 will be erected at once in Eagle River. The present equipment will be about doubled with purchases of new and used tools. Victor Krefl is president and general manager.

The Cadillac Washing Machine Co., Chicago, manufacturer of manual and power-driven washing machines, is negotiating for the lease or purchase of the former plant of the Clinton Creamery Supply Co. at Clinton, Wis., with a view of relocating its plant and headquarters in that city. The Cadillac company recently absorbed the business of the Oden Washing Machine Co., and is incorporated in Illinois with $500,000 capital. E. A. Reinman is president, and H. D. Payne, secretary.

The Oneida Motor Truck Co., Green Bay, Wis., manufacturer of motor trucks and axles, has issued $1,000,000 of 8 per cent serial gold bonds for financing operations. During the spring it made considerable additions to its plant and purchased some new equipment. Lafayette Markle is general manager.

The J. J. Jones Hardware Co., 1017-1019 Third Street, Milwaukee, will build a four-story brick and concrete store and factory, 40 x 120 ft. and will equip two floors as a sheet metal shop and for making hardware specialties. It is also a wholesale and retail dealer in general hardware. The building and equipment will cost about $38,000.

The Neenah Brass Works, Neenah, Wis., has acquired a half interest from John B. Ranz, local, in his invention of a refuse incinerator for dwellings, etc., and is planning to engage in quantity production. The device is built in three sizes.

The Board of Education, Eagle River, Wis., has engaged Parkinson & Dockendorff, architects, La Crosse, Wis., to design a new high school with manual training department, to cost not more than $100,000. It is expected that bids will be taken about Oct. 1 or 15. H. E. Marshall is president of the board.

The Wisconsin Ice & Coal Co., 214-216 West Water Street, Milwaukee, has postponed the construction of an artificial ice producer plant estimated to cost $100,000, at Cambridge Avenue and Thomas Street. Bids taken by C. F. Ringer & Son, architects, were considered too high. New bids will be taken in 30 or 60 days. John H. Kopmeier is president.

The Peerless Electric Co., 2028 Fond du Lac Avenue, Milwaukee, has let the general contract to Byrne Brothers, 2100 Burleigh Street, for a new factory and service building, 45 x 120 ft., part two stories, at Eighteenth Street and North Avenue.

Indiana

INDIANAPOLIS, Sept. 12.

The Vincennes Foundry & Machine Co., First and Perry streets, Vincennes, Ind., has preliminary plans under way for a new plant at Nicholas and Fourteenth streets. J. E. Hartegan is president.

Fire, Sept. 1, destroyed a portion of the coal washery at the plant of the American Coal Co., Bicknell, Ind., with loss reported at about $12,000. It will be rebuilt.

The Indiana Public Service Co., Pearl and West Main streets, Fort Wayne, Ind., will break ground at once for a new power house at 301 Militia Street.

The Bureau of Yards and Docks, Washington, Navy Department, has completed plans for an addition to its power house at Annapolis, Ind., and will take bids at once.

The O. K. Battery Co., 515 Broadway, Gary, Ind., has plans under way for rebuilding the portion of its electric storage battery plant, recently destroyed by fire with loss of about $30,000. The new structure will be one-story, 100 x 200 ft., estimated to cost the amount of fire loss.

The Board of Trustees, Indiana University, Bloomington, Ind., will commence work at once for extensions and improvements in the power house at the institution, estimated to cost about $40,000.

The Central South

ST. LOUIS, Sept. 12.

The St. Louis office of Manning, Maxwell & Moore sold a Warner & Swasey turret lathe to the Guston-Bacon Mfg. Co., Kansas City.

The Standard Stamping Co., 2000 North Broadway, St. Louis, has awarded contract to the A. H. Haessler Contracting Co., Wainwright Building, for a new one-story plant, 107 x 132 ft., at Broadway and Madison Street, for the manufacture of enameled metal products.

The Joplin Center Cord Tire & Rubber Co., 815 Main Street, Joplin, Mo., manufacturer of automobile tires, will build an addition to cost about $25,000. J. L. Courvoiser is treasurer.

The Williams Radiator Co., St. Louis, has leased a local building, totaling about 20,000 sq. ft. of space, for the establishment of a new works.

The Chicago, Rock Island & Pacific Railroad Co., 137 West Van Buren Street, Chicago, has arranged for the immediate erection of its proposed new car repair shop at Trenton, Mo., one-story, 87 x 400 ft., estimated to cost about $80,000.

The Rainbow Oil Co., Greenville, Miss., recently organized with a capital of $500,000, is considering the erection of a new oil refinery. E. L. Wortham, El Dorado, Ark., heads the company.

The Norton Iron Works, Ashland, Ky., will proceed at once with the construction of a two-story addition, 150 x 200 ft., for the manufacture of wire-fencing, wire-cloth and similar products. T. M. Adams is president and general manager.

The City Ice Co., Twenty-first and Campbell streets, Kansas City, Mo., is completing plans for the erection of two new cold storage plants, each about 42 x 80 ft. F. D. Whiting is general manager.

The Ruckel Engineering Co., Hutchinson, Kan., has plans under way for municipal electric power and light plants at Quinter and McCracken, Kan., each estimated to cost about $45,000.

The Cinderella Aluminum Heel Co., 107 South Seventh Street, St. Louis, has leased a local building for the establishment of a new plant to manufacture aluminum heels and other metal products. Robert Tabor is general manager.

The General Woodwork Mfg. Co., 3201 North Broadway, St. Louis, has acquired a local plant, including adjoining property, for the establishment of a branch works to manufacture automobile and truck bodies. It is proposed to install machinery and commence operations at an early date. C. W. Redecker is vice-president and general manager.

The Tennessee Grain Softener Co., Chattanooga, Tenn., recently organized to manufacture metal equipment for grain softening service, is planning the erection of a factory. It is headed by L. E. Glass and B. B. Newman, Chattanooga.

Conveying machinery, loaders, transmission and other mechanical and electrical equipment will be installed in the new grain elevator to be constructed at St. Joseph, Mo., by the Chicago, Burlington & Quincy Railroad, 547 West Jackson Street, Chicago, estimated to cost about $200,000. The Burrell Engineering & Construction Co., 327 South La Salle Street, Chicago, is engineer and will soon call for bids.

The Board of Education, Lawrence, Kan., is arranging a list of machine tools and other equipment for installation in the manual training department at the proposed new high school.

The Progress Pressed Brick Co., Louisville, is planning the erection of an addition to increase the daily capacity from 25,000 to 45,000 brick. A. P. Hildebrand is president.

The Common Council, Crescent, Okla., is perfecting plans for a new municipal electric power plant to cost about $40,000.

The Missouri-Pacific Railroad Co., St. Louis, has had plans prepared for a new one-story car repair shop at Poplar Bluff, Mo. Bids will be asked at once. E. A. Hadley is chief engineer.

Fire, Aug. 25, destroyed the service and repair works of the Ferguson Motor Car Co., Pawhuska, Okla., with loss estimated at about $100,000. It will be rebuilt.

J. H. Schmidt, Muskogee, Okla., and associates, have awarded a contract to Dickman & Nelson, Muskogee, for a new one-story plant to manufacture electric storage batteries and kindred equipment, estimated to cost about $60,000.

The Gulf States

BIRMINGHAM, Sept. 12.

The Eggleston Oil Corporation, Somerset, Tex., is planning the erection of a new refinery to cost about $55,000.

Fire, Aug. 28, destroyed the repair shops of the Ford Motor Co., Tyler, Tex., with loss estimated at about $40,000.

The Van Zandt Cotton Oil Co., Willis Point, Tex., recently organized with a capital of $600,000, is planning for the erection of new works estimated to cost in excess of $100,000. W. P. Allen heads the company.

The Artesian Ice Co., Carbon Hill, Ala., recently organized, is planning the erection of a new ice-manufacturing plant, with machinery installation estimated to cost approximately $15,000. James Nichol, Jr, is president, and I. E. Cooper, secretary-treasurer and general manager.

The Southern Electrolyte Battery Co., New Orleans, has acquired a local building for the establishment of a new works to manufacture electric storage batteries of special type. The structure will be remodeled and equipment installed at an early date.

The Texas Imperial Co., Fort Worth, Tex., is planning the erection of a new refinery with initial output of about 100 bbl. per day.

The Jahncke Dry Dock & Ship Repair Co., New Orleans, has acquired the plants of the Crescent City Machine & Mfg. Co. and the Stearn Foundry Co. for extensions to its works. It is also negotiating for a portion of the Government property known as the Jackson Barracks, and proposes to construct a new works. The expansion program is estimated to cost close to $1,000,000.

The Rule-Jayton Cotton Oil Co., Stamford, Tex., recently organized with a capital of $200,000, is planning the erection of a cotton oil mill estimated to cost close to $100,000. C. M. Francis heads the company.

Harry K. Johnson, 1003 Hibernia Building, New Orleans, and associates have plans under way for a new electric power plant with generating capacity of about 1000-hp., estimated to cost about $200,000 with machinery.

The Baton Rouge Ice Co., Baton Rouge, La., is planning for the installation of new machinery to double the present capacity.

Hopkins & Duffy, Waco, Tex., have awarded a contract to J. M. Bush, Waco, for a new two-story plant, 100 x 125 ft., for the manufacture of automobile bodies, tops and other automotive equipment.

The Louisiana & Arkansas Railroad Co., Stamps, Ark., is completing plans for a new one-story locomotive repair shop. E. F. Salisbury is chief engineer.

The Auto Truck Co., Tallahassee, Fla., has been incorporated with a capital of $50,000 by L. R. Moore and G. E. Mabry, Tallahassee, to manufacture truck parts and other automobile equipment.

The Common Council, Gainesville, Fla., is planning for extensions and improvements in its municipal electric power plant to cost about $30,000.

The Transcontinental Petroleum Co., Tampico, Mex., is completing plans for a new one-story works for the manufacture of oil drums, cans, etc. It is estimated to cost about $450,000.

The new plant of the Tidewater Glass Co., Jacksonville, Fla., will comprise two manufacturing units, each to cost

about $150,000. The installation will include annealing ovens, tanks, glass furnaces, with mold shop, power house, and other departments. Later a number of additions will be constructed. The company is headed by C. H. Dankworth and F. W. Stewart. It is represented locally by the Chamber of Commerce, B. R. Kessler, secretary, which is interested in the project.

The Putnam Fluid Lift Co., Breckenridge, Tex., has been incorporated with a capital of $25,000 by F. M. Gill, C. O. Lund and S. C. Barton, Breckenridge, to manufacture mechanical equipment for oil well and other service.

California

LOS ANGELES, Sept. 6.

The City Council, Sacramento, Cal., is considering a bond issue of $8,000,000 for the construction and operation of a municipal electric power plant.

The Pacific Coast Tire & Rubber Mfg. Co., Los Angeles, has been incorporated with a capital of $2,000,000 by William B. Wightman, J. B. Treadwell and O. C. Emery, to manufacture automobile tires and other rubber products. It is represented by Owen C. Emery, 106A East Broadway, Glendale, Cal.

The Los Angeles & Salt Lake Railroad Co., Los Angeles, has awarded a contract to V. P. Gilbert, 431 Citizens' National Bank Building, for a new one-story works, 100 x 250 ft., at 2204 East Sixth Street.

The Pacific Tank Gage Co., Eddy Street, San Francisco, manufacturer of gasoline and other tank gages, has removed its plant to 167 Jessie Street for increased production.

The Alma Electric & Supply Co., Los Angeles, has been incorporated with a capital of $75,000 by A. E. Westphal, Iver J. McAllister and Joseph O. Poole, to manufacture electrical products. It is represented by Arthur J. Michell, Alhambra, Cal.

The Precision Mfg. Co., Los Angeles, has filed notice of organization to manufacture precision mechanical equipment. It is headed by Iver L. Shogran, 2861 San Marino Street.

The Washington Union High School District, Easton, Fresno County, Cal., will equip a machine shop in a new school building to be constructed. J. A. Poytress is clerk.

D. E. Culbertson, 1222 Ninety-third Avenue, Oakland, Cal., has filed plans for a one-story machine shop at 50 South Eighty-first Street.

E. C. Leach, 40 College Avenue, San Francisco, has filed plans for a new one-story foundry for the production of iron and other metal castings.

The De Corse Mfg. Co., 43 Mesquit Street, Los Angeles, has been organized to manufacture mechanical products and operate a general machine works. M. D. Fraser, 1339 West Twelfth Street, heads the company.

The Power Bureau, Los Angeles, E. F. Scattergood, chief engineer, has plans under way for a new power plant for the municipal power system, estimated to cost close to $100,000.

The Southern California Telephone Co., Los Angeles, has plans under way for a one-story automobile service and machine shop, for company cars and trucks, estimated to cost about $140,000, including equipment.

The San Joaquin Light & Power Corporation, Fresno, Cal., has been granted permission to erect two hydro-electric generating plants on the Kern River. One will have a capacity of about 16,800-hp. and is estimated to cost close to $1,000,000; the other will have a rating of 7700-hp. and will cost approximately $880,000.

The Kansas City Boiler & Welding Co., 1779 North Main Street, Los Angeles, has filed notice of organization to manufacture boilers, tanks, etc. Conrad A. Byloff, 324 West Thirty-third Street, heads the company.

Canada

TORONTO, Sept. 10.

The Canadian National Exhibition has helped to stimulate machine-tool buying a little and some companies having exhibits have received a few small orders, but no large buying is yet manifest. Small tools are still backward, users purchasing only for immediate needs. Some dealers are shading price to secure business, but no reductions have been made in quotations recently.

Arrangements have been concluded for the financing of a $10,000,000 power development at Great Falls, Man., on the Winnipeg River, according to A. W. McLimont, vice-president Winnipeg Electric Railway Co. The plant will have a capacity of 168,000-hp., and is expected to be completed and in operation in 1927. Construction has started and about 200 men are now employed. Later from 1000 to 2500 men will be at work. The project will be carried out by the Manitoba Power Co., Ltd., which is taking over the plant and assets of the Winnipeg River Power Co., Ltd. Sir Angus Nanton is president of the new company and A. W. McLimont, vice-president, will have control of the construction and operation of the plant.

Arrangements have been approved whereby the plant of the Preston Car & Coach Co., Preston, Ont., will be taken over by the Canadian Brill Co., Ltd, a subsidiary of the J. G. Brill Co., Philadelphia, Pa. The new owner will start operations immediately and has a substantial volume of orders on hand. The president of the Canadian company is Samuel M. Curwen, Philadelphia, president of the Brill company and all subsidiaries; first vice-president, H. K. Hauck; second vice-president, A. N. W. Clair, Preston; H. D. Scully is general manager.

The plant and building of the W. C. Hunt Brass Mfg. Co., 30 Holly Avenue, Toronto, was damaged by fire Sept. 6, with a loss of $30,000. It will probably be rebuilt immediately. This makes the third fire in the past two months.

Joseph Langevin, Coteau du Lac, Que., will receive bids until Sept. 30 for electric light and power plants to cost $30,000.

H. W. Hill, Box 164, Preston, Ont., is in the market for 2-ton chain blocks, and a 1½-ton block.

Armstrong Whitworth of Canada, Ltd., 298 James Street, Montreal, whose plant at Longueuil, Que., was closed some time ago, will dispose of the following equipment: Seven automatic screw machines; two boring mills; one centering machine; three jib cranes; four drills; electrical equipment, including one 3 and one 6-ton Heroult electric furnaces, generators, etc.; steam engines; drill fluting machines; grinders; steam hammers; lathes; milling machines; presses; relieving lathes; rolling mills; shears; tanks; metal testing machines; pumps; boiler and steam plant equipment; time clocks; foundry ladles; cranes; also miscellaneous tools, high-speed and carbon steels, motors, etc.

The Wallace Barnes Co., Bristol, Conn., has taken over the plant formerly occupied by the National Machinery & Supply Co., Hamilton, Ont., and will manufacture its regular line of screw machine products, cold rolled spring steel, wire, washers, stampings, springs, etc.

Plans of New Companies

The Pennsylvania Foundry Supply Co., Philadelphia, was organized to meet the special requirements of foundries from the standpoint of quality, price and service. The company is acting as manufacturer, dealer and agent for all kinds of supplies and equipment needed by foundries making ferrous and non-ferrous castings. It is the Eastern distributor of the Mac Co., Inc., Milwaukee, of its parting, high temperature furnace cement, brass cleaner and core compound. It has warehouse facilities in Philadelphia. H. E. Mandel, formerly of the Lindsay Chaplet & Mfg. Co., is general manager.

A new corporation, the Marlin Firearms Corporation, has purchased the former Marlin firearms plant at New Haven, Conn., and has acquired all of the machinery, tools, fixtures, gages, patterns, good-will, inventory, etc., of the business, which has heretofore been conducted by the Marlin Firearms Co. and the Marlin-Rockwell Corporation. The new corporation will manufacture the full Marlin line of repeating rifles and repeating shotguns; also single shot rifles, single guns, double barrel guns and revolvers. The factory organization includes all of the important men of the old Marlin firearms organization—practical gun makers with from 15 to 20 or more years of experience in the manufacture of high-grade firearms. The officers of the company are John F. Moran, president; LeRoy Sargent, vice-president; Reuben Hill, secretary and treasurer. The directors are these officers with Howard E. Adt and Thomas M. Steele.

The Pure Aluminum Co. of America, 180 Centre Street, New York, will manufacture aluminum cooking utensils to be marketed under the name of "Nobolo Ware." The company contemplates the erection of its own rolling mills and has completed arrangements with the Bush Terminal sales representatives to handle part of the distribution of its products. F. E. Grabo, who controls the E. O. Grabo Machine Works, New York, is vice-president, in charge of production. Burnett L. Shaw is president.

The Lumen Bearing Co., Buffalo, and Youngstown, Ohio, manufacturer of machinebronze, brass and bronze castings and bearings, solders and babbitts, has established in Chicago a branch office to handle business west of and including Michigan, with the exception of Detroit, and west of a line from Toledo to Columbus to Cincinnati; Kentucky, Tennessee and Georgia. H. S. Huncke is the Western sales manager, with Henry Waters as associate salesman. The office is located at 15 North Jefferson Street, Chicago.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers or shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

	Per Lb.
Bars:	
Refined bars, base price	2.78c.
Swedish bars, base price	10.00c.
Soft steel bars, base price	2.78c.
Hoops, base price	3.88c.
Bands, base price	3.43c.
Beams and channels, angles and tees 3 in. x ¼ in. and larger, base	2.88c.
Channels, angles and tees under 3 in. x ¼ in., base	2.78c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	2.75c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	2.95c.
Toe calk, ½ x ⅜ in. and larger	3.45c.
Cold-rolled strip, soft and quarter hard	10.00c. to 10.50c.
Open-hearth spring steel	4.25c. to 6.00c.
Shafting and Screw Stock:	
Rounds	4.38c. to 4.53c.
Squares, flats and hex	4.98c. to 5.03c.
Standard cast steel, base price	14.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

¼ in. and heavier	2.88c.

Sheets

Blue Annealed

	Per Lb.
No. 10	3.28c.
No. 12	3.33c.
No. 14	3.38c.
No. 16	3.48c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	3.80c. to 4.05c.	.....
Nos. 22 and 24	3.85c. to 4.10c.	4.50c.
No. 26	3.90c. to 4.15c.	4.55c.
No. 28	4.00c. to 4.25c.	4.65c.
No. 30	4.25c. to 4.50c.	.....

No. 28, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14	3.90c. to 4.10c.
No. 16	4.05c. to 4.25c.
Nos. 18 and 20	4.15c. to 4.40c.
Nos. 22 and 24	4.30c. to 4.55c.
No. 26	4.45c. to 4.70c.
No. 27	4.60c. to 4.85c.
No. 28	4.75c. to 5.00c.
No. 30	5.25c. to 5.50c.

No. 28, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel	Black	Galv.	*Wrought Iron*	Black	Galv.
½ in. Butt...	—48	—32	¾ in. Butt...	—30	—13
¾ in. Butt...	—54	—39	1-1½ in. Butt.	—32	—16
1-3 in. Butt..	—56	—42	2 in. Lap.....	—27	—10
3½-6 in. Lap.	—51	—37	2½-6 in. Lap.	—30	—16
7-12 in. Lap..	—43	—27	7-12 in. Lap...	—29	— 7

Steel Wire

BASED PRICE* ON NO. 9 GAGE AND COARSER	Per Lb.
Bright basic	3.75c. to 4.00c.
Annealed soft	3.75c. to 4.00c.
Galvanized annealed	4.50c. to 4.75c.
Coppered basic	4.25c. to 4.50c.
Tinned soft Bessemer	5.75c. to 6.00c.

*Regular extras for lighter gages.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	15¼c. to 18¼c.
High brass wire	16¼c. to 20¾c.
Brass rod	13¼c. to 19¾c.
Brass tube, brazed	26½c. to 30½c.
Brass tube, seamless	18 c. to 19½c.
Copper tube, seamless	19½c. to 21¾c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 19½c. to 22½c. per lb. base.

Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin		Coke—14-20		
			Primes	Wasters
Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	80 lb...	$6.80	$6.55
		90 lb...	6.90	6.65
		100 lb...	7.00	6.75
IC..	$10.60	$9.50	IC...	7.20	6.95
IX..	11.80	10.75	IX...	8.10	7.85
IXX..	13.60	12.25	IXX...	9.10	8.85
IXXX..	15.60	14.25	IXXX...	10.50	10.25
IXXXX..	17.20	16.00	IXXXX...	11.50	11.25

Terne Plates

8-lb. Coating 14 x 20

100 lb.	$7.50
IC	7.75
IX	8.00
Fire door stock	11.00

Tin

Straits pig	28c.
Bar	34c. to 35c.

Copper

Lake ingot	15c.
Electrolytic	15c.
Casting	15c.

Spelter and Sheet Zinc

Western spelter	6c. to 6¼c.
Sheet zinc, No. 9 base, casks	11½c. open 12c.

Lead and Solder*

American pig lead	5c. to 5½c.
Bar lead	6¼c. to 6¾c.
Solder, ½ and ½ guaranteed	20¼c.
No. 1 solder	18½c.
Refined solder	15¾c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb	80c.
Commercial grade, per lb	40c.
Grade D, per lb	35c.

Antimony

Asiatic	6c. to 6½c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	29c. to 31c.

Old Metals

The market is stronger and prices are a little higher. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy and crucible	9.75
Copper, heavy and wire	9.00
Copper, light and bottoms	7.75
Brass, heavy	4.50
Brass, light	3.75
Heavy machine composition	7.50
No. 1 yellow brass turnings	4.25
No. 1 red brass or composition turnings	6.25
Lead, heavy	3.75
Lead, tea	2.50
Zinc	2.50